Body-Weight and Shape Attentional Biases in Non-Clinically Eating Disordered Women

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Abstract

Research has shown that those with clinically-diagnosed eating disorders selectively attend to schema-congruent information and away from schema-incongruent information. Evidence supporting these claims comes from cognitive tasks such as word based visual probe tasks (VPT). Results for restrained eaters and dieters have been equivocal, and those for emotional eaters not yet been explored. It has been suggested that word stimuli are not sufficiently salient, naturalistic or variable enough in emotional intensity to evince significant effects in these groups. Therefore, the present research aimed to explore the mechanisms of attentional bias in restrained and emotional eaters and dieters, using pictorial stimuli. The pilot study successfully developed a set of body image stimuli for use in subsequent studies. Using a pictorial VPT, studies 1 and 2 discovered that high-restrained eaters showed a bias towards fat body images and a tendency to avoid thin body images in body-neutral pairings. This 'fat bias' was found to be due to slowed disengagement, rather than to increased vigilance as has previously been suggested. Similar trends were found for high-emotional eaters, but not for dieters. An opposing pattern of results to those for body-neutral pairings were found for the high-restrained eaters when viewing fat-thin pairings, a result explained by the operation of inhibitory mechanisms. Studies 3 and 4 used more direct tests of disengagement and explored more thoroughly the timecourse of attentional biases. No significant effects were found as a function of restrained or emotional eating status. The timecourse of attention, competition and the nature of body image associative networks were thought to play a key role in the discovery of attentional biases in non-clinical samples. This work extends our understanding of attentional processing in non-clinically eating disordered women and may have important implications for existing theories and treatments for those with clinically diagnosed eating disorders.

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AUTHOR'S DECLARATION

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Signed S. J. Nelson

Date 2nd June 2006

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List of Abbreviations

AF: Attentional focusing

ACS: Attentional Control Scale

AN: Anorexia Nervosa

APA: American Psychiatric Society

AS: Attentional shifting

BED: Binge Eating Disorder

BMI: Body Mass Index

BN: Bulimia Nervosa

BCQ: Body Checking Questionnaire

BSQ: Body Shape Questionnaire

CBT: Cognitive Behavioural Therapy

COVAT: Covert Orienting of Attention Task

DASS: Depression Anxiety Stress Scales

DEBQ: Dutch Eating Behaviour Questionnaire
- R: Restrained Eating Subscale
- E: Emotional Eating Subscale
- X: External Eating Subscale

DSM: Diagnostic and Statistical Manual of the APA
-R: Revised version

DSO: Degree of Subjective Overweight

EDA: Eating Disorders Association

EDI: Eating Disorders Inventory
-BD: Body Dissatisfaction subscale
-DT: Drive for Thinness Subscale

EDNOS: Eating Disorder Not Otherwise Specified

EI:	Eating Inventory
FAB:	Flour Advisory Bureaux
FSA:	Food Standards Agency
GAD:	Generalised anxiety disorder
HT:	Highly threatening (stimuli)
ICD:	International Classification of Diseases
MT:	Mildly threatening (stimuli)
ND:	Non-Dieter
NICE:	National Institute for Clinical Excellence
ONS:	Office for National Statistics
RS:	Restraint Scale
RRS:	Revised Restraint Scale -CD: Concern for Dieting Subscale -WF: Weight Fluctuation Subscale
RT:	Reaction time
SCI:	Shapiro Control Inventory
SES:	Self-Esteem Scale (Rosenberg)
VPT:	Visual probe task
WHO:	World Health Organisation
WHR:	Waist-to-Hip-Ratio
2DWHR:	Two-Dimensional Waist-to-Hip-Ratio
WLD:	Weight-Loss Dieter
WM:	Weight-Maintainer

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CHAPTER 1

The female body: Beauty, body hate and the destructive path to change

1.1 THE FEMALE BODY: THE TRUTH ABOUT BEAUTY

British women are the least comfortable describing themselves as beautiful, according to a recent report commissioned by Dove™ (Unilever), which surveyed 3200 women from 10 countries. In fact, only 2% of women worldwide said that they would be happy to describe themselves as beautiful. This is particularly so in the 18 – 29 years age group where only 4% chose beautiful as a descriptor for the way that they looked ("The real truth about beauty: A global report"; Etcoff, Orbach, Scott & D'Agostino, 2004). Interestingly, the concept of 'beauty' appeared to be inherently linked with '*physical* attractiveness' and the women in the survey used the two descriptors interchangeably. This occurred even though when on more detailed questioning, the women described 'beauty' as much more about *internal* characteristics such as happiness, confidence and the experience of being loved. This link is possibly borne out of societal conditioning, but the result is that beauty is given a much narrower framework of definition making it less attainable for most women. Nancy Etcoff in her introduction to the Dove™ report describes the modern incarnation of beauty thus;

> The diversity of human beauty has been strained through a sieve of culture, status, power and money and what has emerged is a narrow sliver of the full panorama of human visual splendor.....(p. 4)

She believes that; "Ethereal weightlessness and Nordic features are now its only incarnation" (p. 4).

Similarly, in the same report Orbach states that;

> there has been an insidious narrowing of the beauty aesthetic to a limited physical type – thin, tall – which inevitably excludes millions and millions of women. The conjunction between democratizing the idea of beauty and the limiting of what constitutes the ideal of beauty has caused considerable anguish to women – young to old – who strive to find in themselves the means to meet those aesthetic values, which have come to make up what we regard as beautiful (p. 5).

Only 13% of all the women studied said that they were satisfied with their weight and shape, with over half of all British women believing that their weight was too high. Given this information it is unsurprising that the vast majority of women are unwilling to describe themselves as beautiful. Overall, those women who thought of beauty more in terms of internal attributes experienced less body dissatisfaction. Most women felt under pressure to conform to these narrowly defined concepts of beauty with many believing that beautiful women received better opportunities in life. However, they also felt that these beauty ideals were unattainable. This inevitably leads to feelings of lack of control. The outcome of such a seemingly uncontrollable situation must surely be negative. Stice and Shaw (2002) report that body dissatisfaction often results in feelings of emotional distress and sadly, when asked to respond to the statement "When I feel less beautiful, I feel worse about myself" half of the women strongly agreed.

Given that higher body dissatisfaction appeared to be linked with the more physical attributes of beauty and that feeling less beautiful was linked to negative feeling about themselves; it would follow that those less satisfied with their body would be motivated to change them in some way. Most of the women in the beauty survey reported that plastic surgery was not something they would wish to pursue. However, the

study failed to explore the role of dieting and restrictive eating in the pursuit of beauty ideals. Cosmetic surgery, although becoming increasing popular, is still an extreme and expensive way in which to change the look of your body. Dieting on the other hand is relatively accessible to all.

Dieting is a common strategy used in order to mediate the effects of body dissatisfaction (Stice & Shaw, 2002). However, these authors also point out that such behaviour often comes with an increased risk of eating related pathology. With sustained dieting, control over eating behaviour switches from internal, physiological cues to cognitive processes. These tend to be open to influence from mood and comments from others (through reinforcement or weight loss or negative comments about weight). Body dissatisfaction may also lead to risky behaviours, such as bingeing and purging. If taken to the extreme, dieting, bingeing and purging may result in intractable, full-blown clinical eating disorders. However, clusters of symptoms such as, maladaptive eating practices, dysfunctional thoughts regarding weight, shape and food, and excessive concerns about thinness are thought to be present in considerable numbers of particularly young women without diagnosable disorders (Cohen & Petrie, 2005). Moreover, whilst not reaching the levels of those with eating disorders, the extent of these behaviours and cognitions result in considerable distress. Many suggest that these women lie on the midpoint of a continuum of eating behaviour from normal to clinically disordered eating (Tylka & Subich, 2003). Female university and college students have a raised probability of developing eating related problems, many of which may be considered to be 'symptomatic' (Cohen & Petrie; Mintz & Betz, 1988). Barth (2003)

states, "The college experience is tailor-made for the development of eating disorders"(p. 4). She goes on to say that;

> Good and bad emotions can be softened and even obliterated by starvation, overeating, purging and/or obsessive exercise; and the feelings that bombard college students sometimes are so overwhelming that desperate means, like an eating disorder, seem to be the only way to cope with them (p 4-5).

Mintz and Betz found that 61% of their sample of psychology undergraduates had some form of eating related problem such as bingeing, purging or chronic dieting. Groves and Devlin (2004) carried out an action research study at the University of Cardiff, UK. They found that each year between 10-17% of students who requested a counselling session, reported some form of eating related difficulty. Moreover, the prevalence of anorexia nervosa (AN) amongst the students was 29% compared to the general population prevalence of 0.5-1%. Cohen and Petrie (2005) think it is likely that half of all college women endure eating behaviours that may be of a symptomatic or diagnosable level. However, they believe that despite the considerable distress caused by these symptoms, mental health professionals often overlook these women. They therefore believe that it is important to further explore the relationship between symptomatic and full-blown eating disordered behaviour and cognition; as this will be key in the assessment of risk factors and the development of relevant treatment strategies.

1.2 AIMS OF THE CURRENT WORK

It is the aim of this work to inform the reader of the current state of research as it pertains to eating behaviours along a continuum. In Chapter 1 the importance of

studying symptomatic individuals, such as chronic dieters and restrained eaters, will be discussed. It appears from the preceding research that women are particularly vulnerable to the development of eating and body image related problems. It is acknowledged however, that males are not immune to these concerns although accurate data are even more difficult to obtain on this group. The interested reader is referred to a review of health care resources for men with eating disorders conducted by Cooperman (2000) for the Eating Disorders Association (EDA). A comprehensive general review can also be found in a book by Arnold Anderson (1990), a renowned researcher on the subject of males and eating disorders.

Cognitive behavioural theories of eating disorders have been developed in order to try to explain the maintenance and aetiology of disordered eating and are used as a framework for the development of cognitive behavioural therapies. These will be discussed with a particular concentration on implicit beliefs about weight and shape. In order that cognitive behavioural therapy (CBT) be effective for the greatest variety of aberrant eating behaviours, it needs to be grounded on a sound theoretical framework. Anxiety researchers have increasingly turned to experimental methods garnered from cognitive science in order to further develop theories of anxiety maintenance. These methods have become progressively more sophisticated and have been successful in explaining the underlying attentional mechanisms associated with both generalised anxiety disorders as well as more specific anxiety related illnesses. Unfortunately, research in the field of eating disorders is lagging woefully behind that of anxiety. Chapter 2 will look specifically at existing methods of assessing implicit weight and shape related cognitions and will suggest possible improvements to these methods. This thesis consists of 4 studies that all use methods taken from experimental cognitive

psychology to assess the mechanisms underlying weight and shape related biases of attention in non-clinically eating disordered females. Chapter 3 is concerned with the derivation of a 'gold standard' set of pictorial stimuli for use in the subsequent studies. Studies 1 (Chapter 4) and 2 (Chapter 5) will use these stimuli in a standard measure of attentional bias to assess body shape related biases in those with highly restrained and emotional eating patterns and also in weight-loss dieters. Studies 3 (Chapter 6) and 4 (Chapter 7) use slightly more sophisticated measures to more closely examine a different aspect of attention (disengagement) not previously studied in the field of eating behaviour. Finally, Chapter 8 will amalgamate the results of all these studies to build up a coherent picture of the attentional mechanisms related to weight and shape concerns in non-clinically eating disordered women. The implications of these findings will be discussed in terms of both treatment and prevention of eating disorders.

Dieting is oft stated as a causal factor in the development of eating disordered psychopathology. Dieters are thought to exist at a 'mid-way' point between 'normal' eaters and those with full syndrome eating disorders. In fact, Mintz and Betz (1988) place chronic dieting on an intermediate level of the eating behaviours continuum alongside behaviours such as, bingeing, purging and fasting. However, Fairburn and Walsh (2002) state that:

> It is a moot point whether dieting and weight concerns should be viewed as risk factors of possible etiological significance or as mere precursors of an incipient eating disorder (p. 175).

The following section of this review aims to explore more fully what is meant by dieting and examines its role in the development of eating disorders.

1.3 HATING THE BODY, HATING THE SELF

1.3.1 Body dissatisfaction – definition, prevalence and effects

The need to diet stems out of a multitude of different factors; for example, the socio-cultural pressure to be thin, increased body mass, familial and peer influence, thin ideal idealisation, negative affect and body dissatisfaction (Stice, 2002). It is beyond the scope of the current account to go into detail on each one of these topics. As the focus of the present research is that of weight and shape concerns, only body dissatisfaction and its role in the onset of dieting and eating pathology will be discussed in any detail. Stice provides an excellent meta-analytic review of all of the other aforementioned topics.

Stice and Shaw (2002) define body dissatisfaction as: "Negative subjective evaluations of one's physical body, such as figure, weight, stomach and hips" (p. 985).

The concept of body dissatisfaction is not a phenomenon restricted to recent years. In 1966, Huenemann, Shapiro, Hampton and Mitchell carried out a longitudinal study on a group of American teenage girls. They found that most of the girls were discontented in some way with their weight and that three quarters of the sample had an intense yearning to lose weight. This is in spite of the fact that only a quarter of the girls were actually overweight. A more recent report entitled 'The Pressure to be Perfect Report' commissioned by the Bread for Life campaign (Flour Advisory Bureau; FAB, 1998) aimed to explore whether or not young women aged from 18 to 24 years old felt under pressure to be perfect. In addition, they were interested in finding out how this pressure affected body image and eating behaviours. Interestingly, they found that half of the women who were classed as being at a healthy weight, wished to be thinner than they currently were. Twenty per cent reported that they have stayed at home at some point because they felt unhappy with the way that they looked and 41% felt

uncomfortable being naked in front of their partner. Sadly, 61% of the women questioned felt inadequate compared with the media ideal of a 'beautiful' woman. It is easy to see then why so many women feel the need to diet.

Fairburn (1995) states that the shame that many women experience because of negative perceptions about their bodies, has an adverse effect on their everyday life and relationships. For example, in addition, to not wanting their partner to see their bodies, they may feel uncomfortable with anyone touching areas of their body that they believe to be fat. In relationships where a partner finds it difficult to understand the concerns that the woman has over her body (particularly when her weight is normal or below normal), all aspects of the relationship may be severely affected. Fairburn also notes that women may avoid activities like swimming that involve wearing a swimsuit, or summer clothes that typically reveal large areas of the body normally kept firmly under wraps. For some these concerns are excessive as can be evidenced by the following quote from a woman with an eating disorder.

> I cannot put into words how repulsed I am with my body. I wish it were possible to wear clothes that disguised one's shape completely. I cannot bear to look at my body and will have no mirrors in the house. I take showers instead of baths to avoid having to look at myself. I have not gone shopping for clothes for more than three years (Fairburn, 1995; p. 57).

This woman's life is clearly severely affected by her weight and shape concerns. However, the figures from the FAB (1998) report illuminate the fact that her views about her body are not that different from any 'normal' community sample. It appears that for many women body satisfaction is synonymous with thinness and that in order to be accepted as beautiful, attractive, or successful within the ideals of modern society, one must be steadfast in the pursuit of thinness. Fairburn (1995) again uses an eating

disordered individual to illustrate the importance of being thin and the negative consequence of being fat;

> My confidence and feelings of self-worth are deeply rooted in the idea that I must be physically attractive, i.e. thin. When I put on weight, even one pound, I risk being unattractive, and I see my future as bleak and lonely. This thought fills me with despair, so I force myself to eat as little as possible" (p. 55).

Stice and Shaw (2002) carried out a review of studies examining the role of body dissatisfaction in the onset and maintenance of eating disorders. They concluded that dissatisfaction with ones body led to an increased risk for eating pathology mediated by elevated dieting and negative affect. Similarly, Fairburn (1995) believes that such concerns are fundamental to the continuation of both bulimia nervosa (BN) and AN and are the motivating force behind not only dieting per se but also the dangerous practices of vomiting and laxative abuse oft seen in both of these conditions. It is clear that body dissatisfaction can have negative effects for women, but how do women measure satisfaction with their bodies on a daily basis? The next section attempts to outline the methods used by women to 'measure' their bodies.

1.3.2 Knowing when we're thin enough; monitoring change

Fairburn (1995) describes some of the methods utilised to monitor appearance by those with heightened concerns about their weight and shape. Many regularly measure those body parts that cause most concern (frequently the thighs). For others, the tightness or looseness of particular articles of clothing are used to gauge weight gain or shape change. Scrutiny of one's body in the mirror is also a common method of monitoring body shape. The weighing scale, of course, is really the only method that most people have of monitoring their weight. It is also the root of distress and despair for many

women. The 'weekly weigh-in' popular at most slimming clubs is both eagerly anticipated and dreaded by many attendees. The gain or loss of one pound can lead to intense joy and celebration or a week of food deprivation and depression. Such are the negative consequences of weighing for some that the act becomes unendurable, and scales are avoided at all costs. Fairburn gives the example of one woman who reports days where she weighs herself up to 15 times, coupled with times where the disgust she has for her body is so strong that she goes without weighing for many weeks at a time.

Once body dissatisfaction has been established, one of the most popular methods of attempting to alleviate the situation is by dieting. This has not always been the case however. The following section briefly outlines the methods used to change women's bodies across time and pinpoints the emergence of dieting.

1.3.3 The female body – historically unacceptable

In accordance with the information discussed above, Ogden (2003) agrees that for the majority of individuals, the initiation of dieting stems from an inherent dissatisfaction with their body. Historically, the need to alter one's body shape in some way has led to sometimes extreme and dangerous practices. These have ranged from Chinese foot binding, breast binding and the wearing of uncomfortably tight corsets, to the modern day equivalents of weight-loss and muscle building (Ogden). It is interesting that most of these practices are concerned with changing the *female* form. Ogden emphasises this point when she states: "For as long as records have been kept and history has been written, the female body has been seen as something to control and master." (p. 103). She goes on to make an important but poignant statement; "No aspect of the female body has ever been accepted simply as it is" (p. 103).

Although this statement refers to societal demands on the female body, it could also be a reference to the discontent and sometimes hatred felt by many women toward their own bodies. Ogden (2003) points out that although with the advent of the 1960's, women were 'allowed' to free themselves of the restraints of corsets, with this new 'freedom' came the need for 'self-control' of the body, and it was at this point that the new fashion of dieting began to emerge.

1.3.4 The prevalence of dieting

The Office for National Statistics (ONS) and The Food Standards Agency (FSA) carried out a diet and nutrition survey of 2251 British adults between July 2000 and June 2001 (Hoare et al., 2004). This revealed that 17% of adults between 19 and 65 years reported that they were currently on a weight reducing diet. Women were more likely to be on a diet than were men (24% vs. 10% respectively). No significant differences were found between age groups on the numbers reporting being on a diet. In a national week long survey looking at the dietary and nutritional habits of British adults, Gregory, Foster, Tyler and Wiseman (1990) discovered that 12% of women compared with only 4% of men reported that they were on a 'slimming diet'. Similarly, Wardle, Griffith, Johnson and Rappoport (2000) in their survey of 1,984 British adults reported that 36% of women versus 21% of men were 'trying to lose weight'. The FAB Report (1998) discovered that out of the 1000 women they surveyed 75% expressed unhappiness with their weight, and 20% reported that they diet either all or most of the time.

In a review of dieting related studies, Hill (2002) noted that the way in which a question was phrased seemed to impact on the number of people that reported dieting/slimming. What is interesting to note here is that whilst the way that questions are phrased and hence figures vary, there appears to be one stable trend; that is, women

are twice as likely as men to report that they are on a diet or have been on a diet at some point in the last year. The only point at which this trend is bucked is when individuals are asked if they are watching what they eat (in order to maintain or avoid weight gain) where virtually equal percentages are seen for both sexes (30% for women and 25% for men).

It is not only adults that engage in dieting and weight loss behaviours. There appears to be an increasing trend for children and young adolescents to express concerns about their weight and shape. For example, Shapiro, Newcomb and Loeb (1997) demonstrated that 29% of boys and 41% of girls aged between 8 and 10 years old utilised dieting and exercise as a means of weight loss. Similarly, Davison, Markey and Birch (2002) conducted a longitudinal study measuring weight concerns and body dissatisfaction in a group of girls at ages 5, 7 and 9 years old. They found that at age 9 years, 14% of the girls reported dieting and had higher levels of dietary restraint than those who were not on a diet. This behaviour was linked to higher levels of body dissatisfaction at ages 5 and 7 years old. These studies show a worrying trend. It may require schools and parents to encourage children to judge success on measures other than body weight and shape; and to measure beauty using internal characteristics such as confidence, happiness, humour and intelligence. However, this may take more of a societal shift.

1.3.5 Dieting and restraint as interchangeable constructs

It is evident from the section detailing the prevalence of dieting that defining the construct is no simple matter. Seemingly, one person's definition and subjective meaning and experience of 'dieting' can be quite different from another's idea of the concept. In the same way as the definition used or the way in which the question is

phrased has an impact on the prevalence estimates of dieting, so may it also affect the interpretation of results of studies purporting to measure various dimensions of groups of 'dieters'. The differential in the way in which dieters are defined and the way that criteria are set when studies advertise for 'dieters' also makes comparisons across studies problematic, even if the same dimension is being measured. This may explain the equivocal results found throughout the field of dieting and eating disorder studies (dieters are often used as comparison groups in this type if study). Therefore, a consensus both on the definition and criteria of dieting is obviously warranted and would certainly make cross-comparison of studies more reliable and informative. Similarly, Hill (2002) states, "dieting is not uniform in its implementation" (p. 80). He points out that for some dieting means a straightforward desire to lose some weight, for others however, it signifies the episodic use of a variety of weight-loss behaviours. Alternatively, many people see dieting as a way of preventing weight gain or maintaining their weight at its present level (Hill). For example, French, Jeffery and Murray (1999) in a study of 1120 volunteers on a weight gain prevention program found that, whereas 17 – 28 % of the sample described themselves as 'dieters', 82% reported that they engaged in behaviours for the purpose of weight control.

A related term, often used interchangeably with dieting is that of restraint or restrained eating. McFarlane, Polivy and McCabe (1999) define dieting as: "the attempt to restrict one's food intake with the intention of reducing or maintaining one's body weight or body size" (p. 261). Polivy (1996) however, incorporates a cognitive dimension into her definition of dieting:

> Dieting involves attempting to ignore *internal hunger signals* and eat less than would normally be eaten, so that one loses weight or maintains an already reduced weight (p. 590).

Lowe (2000) points out that it is important to accurately distinguish between three restraint related terms that are often confused. Firstly, he terms *restrained eating* as that measured by one of the three typically used self-report restraint scales. *Dieting* is again a self-reported answer to a single measure that enquires about dieting status. Lastly, *Dietary Restraint*, is a global reference used to describe the act of restricting ones' food intake. It may be indicative of actual or attempted food restriction.

Polivy (1996) uses the restraint scale (RS: Polivy, Herman & Warsh, 1978) in order to divide participants into restrained and unrestrained eaters. She believes that the 'personality trait' of restraint is equivalent to chronic or intermittent dieting. Therefore, she feels that it is appropriate to use the terms interchangeably. Similarly, Heatherton et al. (1988) describe restraint thus;

> Restraint, rather than referring to a single behavioural tendency, is a multifaceted syndrome involving both a propensity to restrict food intake as well as a tendency to splurge (p. 26).

However, Wardle, Griffiths, Johnson and Rappoport (2000) in a study of 1,894 UK adults found that those who reported that they were trying to lose weight actually carried out only a limited number of restrictive dietary habits. In addition, those who stated that they were attempting to lose weight reported no more restrictive habits than those watching their weight in order to prevent weight gain.

Lowe (2002) also cautions against the use of synonymous use of 'dieting' and 'restrained eating'. He states that; "these two phenomena are neither semantically nor functionally equivalent" (p. 89). Summarising current research in this field, he points out that restrained eaters often show opposite patterns of eating to those claiming to be on a diet. However, results from studies that look at the relationship of restrained eating and dieting do not rely solely on the RS in order to measure restraint and this should be taken

into account when interpreting results and drawing firm conclusions. This is particularly important because it has been reported that the scales are measuring different patterns of eating behaviour. The RS purports to identify 'chronic dieters' where 'real' dieters are thought "likely to exhibit periods of restraint punctuated by episodes of disinhibited overeating" (Heatherton et al., 1988; p. 19). Therefore, these individuals are not expected to achieve weight-loss of any significance. The two other most commonly used restraint scales; The Dutch Eating Behaviour Questionnaire (DEBQ; van Strien, Frijters, Bergers, & Defares) and the Eating Inventory (E.I; Stunkard & Messick, 1985) have been reported to be indicative of more successful restraint of caloric intake or 'successful dieting' and high restrainers assessed by these scales generally do not exhibit the disinhibition experienced by those who score highly on the RS (Lowe, 2000; Heatherton et al.).

1.3.6 The case of emotional eating

A further group of individuals who have been little researched are emotional eaters. Emotional eating is defined as "the tendency to eat in response to negative emotions" (Lindeman & Stark, 2001; p. 251). Lindeman and Stark point out that such a tendency is often associated with bulimic tendencies and obesity particularly for those who are depressed and have higher levels of body dissatisfaction. In addition, Eldredge and Agras (1994) found that those with binge eating disorder reported higher levels of emotional eating and an over concern with issues relating to weight and shape.

1.3.7 Dieting and its role in the development of disordered eating

Wardle et al. (2000) state that when the literature on dieting is examined, the consensus appears to be one of dieting as: "a risky activity, likely to result in pathological weight concerns and unhealthy eating patterns" (p. 534).

One of the earliest and most oft quoted studies on dietary restriction was that carried out by Keys, Brozek, Henschel, Mickelson and Taylor in 1950. Thirty-six, male, conscientious objectors in World War Two, who had no previous history of dieting agreed to take part in a 'controlled' diet which involved eating approximately half of their normal daily intake and which would reduce their body weight by around 25%. Keys et al. reported that the men appeared to develop a preoccupation with food and eating, sometimes even stealing and hoarding food. A lack of concentration and depressed mood was also reported. Interestingly, when the men were finally allowed to eat ad libitum, many reported a loss of control over their eating, and often engaged in bulimic like binges. Keys et al. believed that the symptomatology exhibited by the men was owing to dietary restriction. Although, the circumstances were extreme, many of the symptoms experienced by these men were similar to those experienced by chronic dieters or restrained eaters. Hamden, McNally, and Jimerson (1997) state that the subjects of food, eating and weight frequently preoccupy the minds of dieters. An example of this is illustrated in a study carried out by Warren and Cooper (1988) who explored the psychological effects of dieting on a group of 14 previously non-dieting men and women of normal weight. All were placed on a two-week weight-reduction diet. They were asked to complete a series of visual analogue scales daily measuring food and eating preoccupation, depression, urge to eat, concentration, irritability, tension, and loss of control over eating. The diet resulted in weight loss for all

participants but did not demonstrate any significant change in mood. However, the participants did experience the same preoccupation with food and eating as well as increased urges to eat, as the men in the Keys et al. (1950) study. In addition, in the second week of the diet they achieved higher ratings relating to loss of control over their eating, compared with the baseline and first dieting week measurements, with some participants reporting that these feelings endured even after the diet had ended. The authors concluded that the lack of mood effects was owing to the short duration of the imposed diet. What they believed to be the most significant of their findings were the reports of loss of control over eating, which were particularly remarkable given the short period of the dietary restriction. That the effect was delayed to the second week of the diet, led the authors to suggest that the effect may have become progressively more robust had the diet been allowed to continue.

An important question asked by the current research is at what point along the spectrum do problems begin to arise? At what point do the core weight and shape concerns begin to pervade the full cognitive experience of the sufferer, permeating into all aspects of their lives? When does 'normal' eating become 'disordered'? Before these questions can be adequately explored, it is necessary to explain exactly what is commonly meant by an 'eating disorder'.

1.4 DEFINING AND CLASSIFYING THE 'EATING DISORDERS'

1.4.1 A brief history

It is a common misperception that eating disorders are new phenomena that have developed out of an increasingly thin-obsessed culture. Historical accounts of eating disorders talk of "wasting diseases of nervous origins" as far back as the seventeenth century (Gordon, 2000, p. 14). However, AN was first recognised and conceptualised

concurrently by Charles Lasegue and Sir William Gull, who published papers on the subject in 1873 and 1874 respectively (Gordon). It was termed AN (meaning loss of appetite of nervous origin) by Gull at this time. It is thought that this sudden and simultaneous recognition of the disease was in response to a rapid increase of the disease at this time (Gordon).

Bulimia Nervosa (meaning 'ox hunger') was described and given its title by Gerald Russell in 1979, although Russell (1995) gives various accounts of bulimic type syndromes reported in the 1930's, 40's and 50's. It is not considered relevant to the present research to give detailed accounts of the history of the emergence of the eating disorders. The curious reader is referred to interesting reviews by Vandereycken (2002), Gordon (2000), and Russell (1995).

1.4.2 Defining the concept

Fairburn and Walsh (2002) note that there have been relatively few attempts to define an 'eating disorder'. Most writers, when talking about eating disorders have a tendency to describe them only in terms of their diagnostic criteria. This is typically done using one of the two main psychiatric classificatory systems, the World Health Organisations International Classification of Diseases (WHO; ICD-10, 1992) or the Diagnostic and Statistical Manual of the American Psychiatric Association (APA, DSM-IV; 1994). They therefore suggested the following definition of an eating disorder:

> A persistent disturbance of eating behaviour or behaviour intended to control weight, which significantly impairs physical health or psychosocial functioning. This disturbance should not be secondary to any recognized general medical disorder (e.g., a hypothalamic tumour) or any other psychiatric disorder (e.g., an anxiety disorder) (Fairburn & Walsh, 2002, p. 171).

This definition gives great scope for inclusion and is certainly much more 'lenient' than the current classificatory systems. This is an important point. Many authors within the field of eating-disorder research and clinical practice have highlighted limitations with the current diagnostic criteria (e.g. Garfinkel & Dorian, 2002; Herzog & Delinsky, 2002; Palmer, 2000 and Fairburn & Harrison, 2003). In addition, a related debate currently exists between two opposing factions within the field. This concerns the question of whether or not those with clinically diagnosed eating disorders, who conform exactly to the current diagnostic criteria, differ qualitatively or quantitatively from those classified as having an 'atypical' eating disorder (i.e. they do not fully meet all the criteria laid down by either classificatory system). This debate extends further to ask whether these differences exist between typical and atypical sufferers and non-eating disordered individuals who binge eat, diet or regularly engage in some form of purgatory behaviour in order to reduce their weight (e.g. vomiting, use of diuretics or excessive exercising). The outcome of this debate has important implications for treatment and prevention programs.

1.4.3 A brief note on prevalence

There has been a flood of research involving the eating disorders over the past two decades. This may in part be owing to the recognition by both clinicians and researchers of the increasing prevalence of such disorders. A report published by the Royal College of Psychiatrists in 1992 estimated that around 60,000 people were currently undergoing treatment for an eating disorder in the UK. However, The EDA (Cooperman, 2000) believes this figure to be nearer 90,000. It is thought, however, that many more individuals are likely to suffer from an eating disorder but will not have received a formal diagnosis. Cooperman (2000) estimates the real number of eating disordered

sufferers to be nearer 1.15 million. Along with this has come a realisation that diagnosed and undiagnosed eating disorders are associated with a disturbing rate of mortality and morbidity (Garfinkel & Dorian, 2002). It is concerning that so many individuals are devoid of diagnosis and therefore are most likely not in receipt of support or treatment. It is clear also that this may be owing to problems with classification. Therefore, it is deemed necessary to take a more detailed look at eating disorder classification.

1.4.4 The classification of the eating disorders

It is usual for AN and BN to be treated as separate disorders, with their own distinct classification and diagnostic criteria.

The first operational set of criteria for AN were set out by Gerald Russell in 1970 and specified only three criteria for a diagnosis to be made. These were as follows:

1. Distinct behaviour resulting in marked weight loss
2. A psychological disturbance characterised by a morbid fear of becoming fat
3. Cessation of menstruation (amenorrhoea) resulting from an endocrine disturbance.

In 1979 Russell again proposed criteria, for a disorder that he described as an "ominous variant of anorexia nervosa" (see title of Russell, 1979). These he described as follows:

1. Episodes of overeating ensuing from an intractable and compelling urge to overeat.
2. The abuse of purgatives (laxatives or diuretics) or inducement of vomiting in order to avoid the 'fattening' consequences of food.
3. A morbid fear of becoming fat.

Current diagnostic criteria are still built around this initial framework laid down by Russell. The two most commonly used criteria are those laid down by the APA (DSM-IV-R, 2000) and the WHO (ICD-10, 1992).

A third category of classification also exists. This subsumes all of those individuals with "clinically significant disordered eating attitudes and behaviours who do not meet full diagnostic criteria for anorexia nervosa or bulimia nervosa" (Herzog & Delinsky, 2002, p. 36). The ICD-10, (1992) allots 6 separate codes to this category that it collectively labels as 'atypical eating disorders'. Similarly, DSM-IV-R designates a separate category to those not meeting 'typical criteria' which it entitles 'eating disorder not otherwise specified' (EDNOS).

Garfinkel and Dorian (2002) state that these current diagnostic criteria are reliable and represent a major advance in diagnostic exactitude. However, conversely they believe that they exist not without problem. Two criteria are most typically absent in those diagnosed as atypical AN (Cachelin & Maher, 1998). These are failure to meet a minimally normal weight and weight phobia. Typically, those with a lack of weight phobia are often found in non-Western populations but can also be found in Western cultures. Lee and Katzman (2002) believe this concentration on fat related concerns is problematic and may camouflage the real causative factors; for example, a strong desire to assert control may be the driving force behind the food restriction. This point is particularly important as most of the common measures of eating disorder symtomatology measure in some part a fear of fatness, body dissatisfaction or the need to lose or control weight (Lee & Katzman). The outcome of this may well be missed cases or a diagnosis of EDNOS (Lee & Katzman), with individuals being 'screened out' of research trials or treatment programs. Lee and Katzman believe that this may be the

case in atypical Western cases also, and may be the reason for the relatively low prevalence rates of AN in community epidemiological studies. They go on to say that the use of instruments concentrating on 'fat rejection' may not be capturing "the experiential salience of eating disorders" (p. 262). It should be noted then, that when conducting research of this type the dominant cultural background of the participant should be recorded. This is particularly important when testing university populations who are likely to have diverse cultural populations.

Contrary to the above, Habermas (1996) believes that such arguments ignore the distinct psychological character of AN. He analysed cases of extreme fasting in the third world, in the European late middle ages, early modern times and the latter part of the 19th century for the presence of weight related phobia and their clinical similarity to modern AN. He found modern cases of AN incorporating an element of weight phobia to be quite distinct from the cases of self-induced fasting mentioned above. He therefore believed that the centrality currently given to the concept of weight phobia should remain. Arguments supporting the inclusion of weight and shape concerns centre around the subject of disease course and outcome. Studies have shown that the presence or absence of weight and shape concerns can be predictive of both the course of the disease and it's eventual outcome. For example, Strober, Freeman and Morrell (1999) conducted a study comparing two groups of AN patients, typical and atypical, over a 10-15 year period. Atypical patients were so called owing to their denial of any weight or shape disturbance or phobia. It was discovered that the so called atypical patients had a faster rate of full recovery than the typical group and that they had less chance of crossing over into the binge/purge subgroup of AN. Additionally, they were 19% less likely to develop a more intractable form of the disease than those with weight and shape concerns.

Further evidence for the importance of weight and shape concerns comes from cognitive behavioural theories of AN and BN, a subject that will be discussed in detail later in the present review.

In those with BN, there is much disagreement among researchers and clinicians as to what exactly constitutes a binge; even the criteria laid down in DSM-IV-R are difficult to readily interpret. Research has been carried out in order to ascertain what constitutes a 'typical' binge for example, Rossiter and Agras (1990) found that great variability existed both between and within individuals. The frequency of bingeing is also a hotly debated subject. For example, Garfinkel, Kennedy and Caplan (1995) argue that the criterion as laid down in the official DSM is capricious in nature, and that it has not been empirically tested. Herzog and Delinsky (2002) illuminate the fact that little research has been carried out on those who binge less frequently than twice a week. They state that the research that has been done relies on community data and yields inconsistent results in terms of the effect of sub-criterion levels of bingeing and general outcome. Finally, criteria for what constitutes purging have changed. Herzog and Delinsky note that when this criterion was initially added to DSM-III-R it included the following forms of compensatory behaviours: self-induced vomiting, use of diuretics, strict dieting, fasting, laxatives and vigorous exercise in order to prevent weight gain. However, in DSM-IV (1994) strict dieting and fasting, and excessive exercise were dropped.

It is interesting to note that as the criteria have become more and more specific a greater proportion of people are falling into the criteria EDNOS (Herzog & Delinsky, 2002). It is also clear that it is difficult to interpret where dieting or restrained eating for the purpose of weight control turns from a harmless activity, to one where weight and

shape and the behaviours exerted in order to control them, are beginning to impact on the health of the individual.

1.4.5 The importance of good classification

Correct classification of disorders is crucial. Walsh and Kahn (1997) believe that "We study what we define" (p. 369). Similarly, Herzog and Delinsky (2002) point to the influential nature of systems of classification:

> They shape research agendas and participant recruitment, affect the type of treatment and treatment reimbursement that individuals receive, and influence how prevention and intervention plans are conceptualised and implemented (p. 31)

Certainly, many studies have strict guidelines detailing who can and cannot take part, and participants are asked to fit neatly into specific eating disorder categories based on scores on various inventories or completion of specific interviews. One group who are consistently left out of studies or are ignored for study altogether are those who fit into the category of atypical eating disorders and those with eating disorders not otherwise specified or EDNOS (Fairburn & Bohn, 2005). They go as far to say that EDNOS are "*Cinderella states*" (p. 5), not viewed as priorities by grant-giving bodies. Similarly, Palmer (2003) believes that EDNOS is "*essentially a diagnosis of exclusion*" (p. 161).

1.4.6 The special case of atypical eating disorders and EDNOS

Earlier in this review Fairburn and Walsh's (2002) definition of an eating disorder was stated. In relation to this definition, they define atypical eating disorders as:

> those conditions that meet the definition of an eating disorder but not the criteria for anorexia or bulimia nervosa (p. 172)

In essence, what this means is that their physical health or psychosocial functioning is impaired in the same way as someone with a typical disorder but that they miss diagnosis (and maybe inclusion on treatment programs, research programs etc.) for failing to reach one of the specified criteria. However, this definition is still open to much interpretation, for example, when is psychosocial functioning impaired? What does this mean, and how is it measured? What constitutes impairment for one individual may not be the same for another. It could be considered a rather subjective criterion. Gordon (2000) states that this category is "rather over-inclusive" and that it lacks "theoretical specificity" (p. 19). Indeed, the category of atypical eating disorder covers a wide-ranging group of individuals. Fairburn, Cooper and Shafran (2003) believe that those with atypical disorders share much in common with AN and BN. For example, in some cases certain criteria may not be met (a 'partial syndrome'), in others symptoms may not quite reach the specified threshold, for example, weight may be too high (a 'sub-threshold disorder; Fairburn & Walsh, 2002). Further, many individuals have disorders where the psychopathological features are differentially combined (Fairburn et al.). Fairburn et al. assert that in their own experience, such individuals practice "rigid and extreme dietary restraint" (p. 520), which is often accompanied by bingeing and methods of compensatory behaviour (e.g. laxative abuse). Clearly, these people differ in the extent and severity of their problem, their needs will be different but all will benefit from professional help.

The strict diagnostic criteria group such individuals together in the same category. This is problematic for at least two reasons. Firstly, treatment programs are developed for those fitting one of the two 'typical' disorders. Secondly, if this 'miscellany' of individuals were classed together for the purposes of research that

purports to say something about the group as a whole, we must seriously question the validity of any conclusions that are drawn.

A further misconception regarding atypical eating disorders is that they are somehow less severe than full-blown AN and BN. Fairburn and Walsh (2002) believe that the use of the expression 'sub-clinical' to describe those with an 'atypical' eating disorder constitutes a misuse of the term, as by definition, such individuals suffer from an impairment that reaches clinical significance. In addition, they state that the atypical eating disorders are a cause of considerable morbidity. Many studies appear to support this view. Dancyger and Garfinkel (1995) measured levels of body dissatisfaction as well as other eating disordered related cognitions in eating disordered women as well as those fitting criteria for atypical eating disorders. They discovered that no significant differences existed in these variables between the two groups. Additionally, the atypical group reported considerable psychosocial impairment and general discontent with life, although this was not as great as those with full-blown disorders. In addition, Bunnell, Shenker, Nussbaum, Jacobson and Cooper (1990) found that those with full and partial syndrome AN did not differ significantly on measures of depression, body dissatisfaction and drive for thinness. They believe that this lack of differentiation of psychological variables is indicative of them being core features of AN rather than merely an outcome of the starvation syndrome.

Bunnell et al. (1990) make the point that the boundaries that exist between what are classed as full-blown eating disorders and normative cultural practices and beliefs are often "unclear and ill-defined" (p.358). Nylander (1971) conducted one of the earliest studies looking at atypical eating disorders. She studied a group of female high school students questioning them on issues relating to body image, dieting practices and

physical symptoms. She concluded that most cases of AN are incipient and that they rarely come to the attention of the medical profession but more likely to be cured by progressive maturity. Whether Nylander's cases of AN could by current criteria be described as 'typical' cases or whether in fact they were 'atypical' or even sub-clinical cases is unclear. Additionally, the subject of what constitutes recovery or 'being cured' is a significant subject in itself and has engendered much debate over the years, and continues to do so. What is acknowledged however is that those with atypical eating disorders follow in general a less severe course, and have a better outcome than those with full syndrome disorders (e.g. Hay & Fairburn, 1998; Strober, Freeman & Morrell, 1999).

1.4.7 The 'oneness' of eating disorders - a 'transdiagnostic' theory

Fairburn and Walsh (2002) point to the fact that research that looks at both the course and the outcome of the eating disorders has identified not only a relationship between AN, BN and atypical cases, but also that there exists a great deal of movement between the three groups. Fairburn et al. (2003) use this information to point to the commonalities that exist between the eating disorders, and propose a new theory to account for the persistence of eating disorders that asserts that similar mechanisms are involved in the persistence of AN, BN and atypical eating disorders.

Fairburn et al. (2003) have proposed a 'transdiagnostic' theory of eating disorders. The authors believe that both AN, BN and the atypical eating disorders share many common features that may be involved in their persistence. For example, cognitive behavioural theories of AN and BN state that sufferers of AN and BN both have a tendency to overestimate the importance of weight, shape and eating and their control

(e.g. Garner & Bemis, 1983). Fairburn et al. (2003) suggest that these same disturbances may be present in atypical cases stating that:

> in the great majority of cases there is a central cognitive disturbance characterised by the overvaluation of eating, shape and weight and their control (p. 522).

This leads to similar patterns of behaviours being elicited in both groups, for example, rigid control of food intake, emesis and laxative and diuretic abuse. It is possible that the presence of such beliefs in non-disordered but weight-concerned individuals may, to a lesser extent lead to similar behaviours. Fairburn et al. (2003) do point out, however, that for some, usually younger sufferers of AN, the concentration is mainly on the control of food intake rather than on weight and shape control per se. Major differences between AN and BN do exist of course. The main difference in clinical features noted by Fairburn et al. are the differing body weights of the two groups. Those with AN tend to under-eat with a resultant low body weight. Conversely, the weight of the BN sufferer is likely to be relatively normal as any bingeing is countered with a period of restriction.

Fairburn et al. (2003) note that it is not uncommon for long-term sufferers of AN to traverse the diagnostic criteria and end up with a diagnosis of BN. Initially, the individual with AN has a tendency to starve themselves and is relentless in their pursuit of thinness. Once the AN/BN boundary has been crossed, they embark on frequent bouts of over-eating with a resultant increase in weight and increased fear of fatness (Fairburn et al.).

Longitudinal studies are the main source of evidence for this phenomenon. For example, Drenowski, Yee, Kurth, and Krahn (1994) divided female college freshman into five categories of eating pathology based on their own eating pathology scale founded on the DSM-III-R criteria (APA, 1987). The groups were divided as follows:

probable bulimic, dieter at risk, intensive dieter, casual dieter and non-dieter. Dieters at risk were defined as those who met all criteria for BN except for frequency of bingeing episodes (Drenowski et al., 1994). In other words, by definition these individuals could be described as having an atypical eating disorder. Drenowski et al. (1994) discovered that by the following semester 15% of those initially classified as dieters at risk were now eligible for the label of probable bulimic (i.e. those reporting bingeing episodes or the use of compensatory behaviours more frequently than once a week). Sullivan (2002) carried out a qualitative summary detailing the course and outcome of AN and BN up to 10 years after clinical referral. He discovered that 15% of those with AN had crossed over to a more bulimic type illness, with half of these meeting diagnostic criteria for BN at some point. However, the crossover from BN to AN is relatively rare, with only 1% of individuals traversing in this way. He also illuminates the fact that a considerable number of those with BN continue to show subthreshold symptomatology. Similarly, Sullivan, Bulik, Fear and Pickering (1998) showed that many of those initially diagnosed with AN progressed to an atypical eating disorder over time. In addition, Fairburn et al. (1995) demonstrated that BN could typically stem from or result in an atypical form of eating disorder. Fairburn et al. (2003) state that it is common for an individual to begin with an anorexic like illness in adolescence and progress to a more bulimic type picture as they progress to early adulthood. A common thread throughout all of these crossovers however, remains a central core psychopathology characterised by the heightened importance given to eating, shape and weight and their control (Fairburn et al., 2003: p. 522).

1.5 FROM 'NORMAL' TO 'DISORDERED' EATING: THE ISSUE OF CONTINUITY

1.5.1 Support for the continuity perspective

A related debate also exists that asks whether there is a quantitative or qualitative difference between typical, atypical, sub-clinical and non-eating disordered individuals. Hoyt, Hamilton, and Rickard (2003) state that epidemiological studies carried out on college and university aged females in the United States reveal a high prevalence of AN and BN. However, more startling are the number of women who report eating disorder related symptoms, such as loss of control over eating, laxative abuse, excessive exercise and purging, as well as obsessive concerns over calorie and fat contents of foods, and body-image dissatisfaction and distortion (Hoyt et al.). Numbers reporting these behaviours range between 35-70% of college/university age women (Hoyt et al.). Hoyt et al. note that women displaying such characteristic behaviours have been described as having atypical eating disorders, subthreshold disorders, anorexic profiles and EDNOS. They also point out that although a number of researchers have highlighted the importance of more accurate characterisation of such women, few studies have as yet, attempted to do so. The continuity perspective holds with the belief that these categories lie on a continuum, with non-eating disordered individuals at one end and full-syndromal individuals at the far end (Fitzgibbon, Sánchez-Johnson & Martinovich, 2003). The assumption is that the difference is merely one of degree of severity. In contrast, the discontinuity perspective supports the view that those with full-blown disorders are qualitatively different from those with other forms.

The belief held by the continuity perspective is that those variables that distinguish non eating-disordered individuals from those with sub clinical forms of the

disorder should also distinguish those with sub clinical forms from full syndrome individuals.

Heilbrun and Flodin (1989) identified a group of women who were defined as having anorexic profiles as measured by scores on the Eating Disorders Inventory (EDI; Garner, Olmstead & Polivy, 1983). They were found to exhibit similar, but less intense characteristics as those with typical AN. Hoyt et al., (2003) believe this to be consistent with the continuum perspective of eating disorders. Similarly, Franko and Omori (1999) examined 207 college freshmen and graded them into five separate categories of eating pathology as defined by the Drenowski et al. (1994) eating pathology scale. They demonstrated that those with greater levels of eating pathology had higher levels of depression, dysfunctional cognitions and disordered attitudes relating to food and eating than those with less or no eating pathology. Further to this, it was found that scores on the bulimic automatic thoughts test (BATT; Franko & Zuroff, 1992) and The EDI-2 (Garner, 1991), showed "an orderly downward progression" (Franko & Omori: p. 393). That is, those classified as probable bulimics and dieters at risk scored the highest, whereas the non-dieters attained the lowest scores.

1.5.2 Support for the discontinuity perspective

Ruderman and Besbeas (1992) explored the relationship between dieting and BN. They tested controls, dieters and those with BN using a battery of measures on which those with BN are known to score highly (e.g. anxiety, depression and body image). In study 1 categorical analyses were carried out. The results were mixed, with those with BN differing from dieters in both a dimensional and categorical way depending on the measure under investigation. In study 2, BN and dieting were treated as continuous measures in order to ascertain which of the measured variables would predict their

presence. Again, the results showed a mixed pattern. However, the authors believe that whilst some measures suggest that dieting and BN lay on a continuum of eating behaviour, it would be incorrect to say that BN was only a case of extreme dieting. They point out that as well as scoring more highly on a number of variables, the disturbances suffered by those with BN were much more insidious. They concluded that rather than explaining the relationship as merely one of continuity or discontinuity, it would be best treated as a mixed phenomenon with elements of both perspectives playing an important role.

1.5.3 Problematic analyses: failure to consider relationships between latent variables

The analyses employed in order to investigate studies that aim to support or refute either one of these positions is problematic claim Tylka and Subich (2003). They point out that a majority of the studies use between group designs or trend analyses, neither of which are adequate to explore the associations between the various markers of eating disorders. Instead, they employed a taxonomic approach. The point of such an approach in psychiatry is to explore the possibility that the groups of statistical relationships found between various indicators of a disorder or syndrome are indicative of separate taxa, each with their own singular distribution, or whether in fact they are non taxonic in nature (Meehl, 2004, 1995). Covariance between two of the indicators under study are obtained at every level of a third indicator. The resultant graphs take on specific shapes that are characteristic of either a taxonic or dimensional outcome (Gleaves, Lowe, Green, & Murphy-Eberenz, 2000). Tylka and Subich stated that the use of such analysis might be important in the delineation of clinically disordered individuals from those who

display a less serious pattern of eating disturbance or those who have no eating related problems at all.

The type of indicators used to define the presence of a clinical eating disorder may play an important role in the discrepant results achieved by the two camps (Stice, Killen, Haywood & Taylor, 1998). Tylka and Subich (2003) believe that the measures can be broken down into psychological, socio-cultural and behavioural indicators. They state that behavioural indicators such as those that measure binge-purge behaviour will more likely support the discontinuity perspective as the indicators are confounded with the diagnostic criterion for BN. Alternatively, psychological and socio-cultural measures, such as body dissatisfaction and societal pressure for thinness, are more likely to support the view of dimensionality. Fitzgibbon et al. (2003) also argue that studies that have used measures of psychopathology are more likely to find in favour of the discontinuity perspective. Alternatively, measures that look at co-morbid features, such as depression, are more likely to support the dimensional approach. Finally, Tylka and Subich point out that the many studies that have used a mixed population of non-clinical and clinically-disordered individuals are at risk of finding artificially generated taxon, this is particularly so when behavioural indicators are used.

With these points in mind, Tylka and Subich (2003) carried out a taxometric analyses on a sample of 532 college women (mean age 22.4 years). They used both psychological and socio-cultural (but no behavioural) indicators of clinical eating disorders on which to base the analysis. Their results revealed support for the dimensionality perspective, with the measured indicators showing scores that occurred along a single continuum. One criticism of the study is that it used only a small number of measures with which to make its claims. Nonetheless, its methodology is stronger

than that which has gone before, and it adds strength to the argument for one single dimension of eating behaviour.

Evidence for the discontinuity perspective however, has also been obtained using a taxometric approach. Gleaves et al. (2000) carried out a study on 613 women, a mixture of non-clinical college students and women with BN who were residing at a treatment centre. The indicators used were a common measure of BN (the Bulit-R; Thelen, Farmer, Wonderlich & Smith, 1991) and the EAT-26 (Garner, Olmstead, Bohr, & Garfinkel, 1982), a measure that assesses thoughts and behaviours related to AN, chosen by the authors primarily owing to the fact that it had a greater amount of items that assessed dieting behaviour. They found almost overwhelmingly for the taxonic perspective. The only indicators that showed a dimensional pattern were those of body concerns against restrictive behaviour. Gleaves et al. did use a mixed population however, and aware of the inherent problems associated with doing this they analysed the two populations separately as well as carrying out a mixed analysis. The results were unchanged. Importantly, the majority of indicators used in the final analyses were those that measured binge-purge behaviour, therefore a taxonic result was unsurprising. Consequently, the results of this study should be assessed with caution.

1.5.4 The Importance of studying the 'continuum' of eating behaviours.

Dancyger and Garfinkel (1995) believe that acquiring a greater understanding of these 'partial' disorders is crucial to a fuller comprehension of the nature of eating disorders and their evolution. Such knowledge should surely also lead to an increased appreciation of what factors are involved in the maintenance of the disorders, and also may lead to improved treatment and prevention programmes. Ruderman and Besbeas (1992) believe that the delineation of continuity or discontinuity has important implications for both

research and treatment purposes. They think that if dieters and more clinically disordered individuals were found to lie on a continuum of severity, then it would be advisable to carefully monitor such individuals, if not discourage the practice altogether. This is quite an extreme view, and it would be incredibly difficult and probably unnecessary to take such drastic action. More practically, Tylka and Subich (2003) believe that it is imperative that professionals, such as counselling psychologists, pay attention not only to those with full syndromal eating disorders as defined by DSM-IV criteria but also those with less severe eating disturbances. A study carried out by Tylka and Subich (2002) aimed to assess the cognitions of groups of women who lay at different levels along the eating disorder continuum. More specifically, they questioned them on their views on the effectiveness and safety of a number of maladaptive weight control practices, such as laxative and diuretic use, vomiting, heavy exercise, skipping meals, enemas and eating less than 1200 calories per day. One hundred and sixty-six high school and college women aged from 16 – 38 years (mean age = 21.21 years) were classified as asymptomatic (0 end of continuum), symptomatic (mid-point of continuum) and eating disordered (high-end of continuum) using The Questionnaire for Eating Disordered Diagnosis (Q-EDD; Mintz, O'Halloran, Mulholland, & Schneider, 1997). They found that eating disordered women reported using these behaviours significantly more than the other two groups. Similarly, the symptomatic women utilised the methods significantly more than the asymptomatic group. Moreover, the perceptions of safety and effectiveness of some of the maladaptive practices for short-term use increased in a linear fashion with placement on the continuum, with the eating disordered group endorsing the safety and effectiveness of the practices most positively. It must be said however, that the scores for safety and effectiveness only reached a mean of around 4 on

a 7-point scale and most of the women did acknowledge that long-term use would be detrimental to their health. However, this was not sufficient to prevent them from engaging in the behaviours at the present time. Similarly, when they categorised 643 non-obese and non-anorexic female undergraduates (mean age 18.6 years) into categories that spanned an eating behaviour continuum from normal to bulimic, Mintz and Betz (1988) found that only 33% could be classified as normal eaters. Worryingly, 64% of the women fell on the midpoint between normal and bulimic, with 33% stating that they engaged in maladaptive weight control practices such as diet pill use or purging and a further 38% reporting problems with bingeing.

The above studies are concerning in that they highlight the prevalence of eating attitudes and behaviours that may prove risky in terms of the health of these young women. Tylka and Subich (2002) point out that the fact that maladaptive practices appear to rise with progression along the continuum has important implications for treatment and prevention of disordered eating behaviour. They believe that if perceptions regarding the safety and effectiveness of risky weight control practices can be addressed at an early point, then the disordered eating may be ameliorated.

Looking at shared common features allows the development of effective treatment programmes that may be used on the full range of the spectrum of eating disorders. This allows the diagnosis per se to be disregarded and the treatment to focus on the psychopathology and its maintaining processes (Fairburn et al., 2003). This results in not only a more individualistic approach to care and treatment, but also permits the inclusion of groups of subthreshold/subclinical individuals previously 'fitted in' to existing programmes designed for full syndrome disorders.

Earlier in this review, cognitive behavioural theories of eating disorders were mentioned as important in the development of treatments for these conditions. Cognitive behavioural therapies are the treatment of choice for most eating disorders. They may also play a part in the treatment of those who are at risk for developing eating related problems as well as those who are symptomatic. It is essential therefore that these treatments are grounded in good theory. If these therapies are to be used as a basis for treating symptomatic and at risk populations, it is essential that the theories on which they are based apply equally to those populations. An aim of the current work is to examine the applicability of these theories (as they refer to weight and shape concerns), to those deemed at risk – restrained and emotional eaters and dieters. Before examining more closely the methods used in order to do this, it is important to outline the key cognitive behavioural theories of eating disorders.

1.6 COGNITIVE BEHAVIOURAL THEORIES OF EATING DISORDERS – A REVIEW

1.6.1 Weight and shape and what it means to be fat

Theoretical models have been developed in order to explain the aetiology and maintenance of disordered eating behaviours. Common to all of these models is the central role given to weight and shape and their importance in the everyday life of the individual (Vitousek & Hollon, 1990). Importantly, perceived life success and failure for the eating disordered sufferer is inextricably linked to the successful control of weight and shape. The individual builds up a series of ordered cognitive structures, called schemata, around the subject of weight and shape. Thinness is seen as having "*inestimable worth*" (p. 128) and fatness is to be avoided at all costs (Garner & Bemis, 1982). In fact, fatness is seen as a threat and is *feared*. These are then used to interpret,

simplify and stabilise the individuals' experience of incoming information (Vitousek & Hollon). Similarly, Weinberger and McClelland (1990) describe schemata as being like "molds that fit over incoming information" (p. 570), with information sometimes being altered in order to fit this mold. These schemata have profound effects on the individual, influencing their perceptions, thoughts, affect and even behaviour (Vitousek & Hollon). However, the 'advantage' for the individual is that they secure control (or *perceived* control) over their lives.

Many different types of schema exist. However, Weinberger and McClelland (1990) believe that *self-schemata* are the most complex and vital cognitive structures. They point out that the organisation of the schemata is dependent on individuals' own personal experiences and that, therefore, their boundaries tend to be blurry rather than clearly defined. These schemata are thought to be responsible for interpreting incoming information relating to the self. Weight-related schemata, rather than providing information on the weight/shape status of the individual, organise information relating to what it *means* to be fat or thin (Vitousek & Hollon, 1990). These authors talk about those with AN and BN building up "dense associative networks" (p. 196), between such concepts as thinness and positive attributes, for example, self-control, beauty, and intelligence. Conversely, fatness is associated with negative connotations, such as laziness, stupidity and failure. Such ideas are undoubtedly connected to the general cultural consensus, at least as they exist in Westernised societies. Although it is true that these beliefs are held by many individuals who do not suffer from an eating disorder, Vitousek and Hollon believe that for the eating disordered sufferer the meanings will be "more elaborated, idiosyncratic and emotionally charged" (p. 196). Similarly, Vitousek and Orimoto (1993) point out that some young individuals may be especially susceptible

to the influence of current societal ideals concerning weight and shape. In addition, they may also be more inflexible in their thinking about meanings related to weight and shape.

Following logically on from the previous two schemata are weight-related self-schemata. Here, information about the self is combined with knowledge relating to weight and shape. Vitousek and Hollon (1990) believe these schemata represent;

> The specific psychopathology of anorexia nervosa and bulimia nervosa, converting a diffuse sense of unhappiness and unfulfilled aspiration into a focus on 'fatness'. (p. 196).

Personal value and worth are inextricably tied in with beliefs about the implication and meanings of being fat rather than the actual feeling of *being* fat. Vitousek and Hollon illustrate this by giving examples of the type of conditional statements that may be operationalised by the eating disordered sufferer; "If I am too fat (or thin), I am….., I can (or cannot)…., and I will be revealed as…." (p. 197).

Davis (1986) believes that, owing to their affect ridden and hypervalent nature, these schemata control "all aspects of the patients functioning" (p. 33). The outcome of the individual's identification of self with weight and shape status is that the personal suffering, confusion and sense of inadequacy felt by the disordered individual are relieved. Many eating disordered women report that they feel weighed down by societal and personal expectations and responsibilities as well as their drive for perfectionism and excellence in all that they pursue. Reducing the focus of attention to one of weight and shape control greatly reduces the effect of external stressors. Success is guaranteed and progress quantifiable both by mechanical means (tape measures, weigh scales; Slade, 1982) and through comments from those around them ("you're looking thin",

"haven't you lost weight" etc.). Therefore, each kilogram or inch lost bolsters self-worth and personal esteem.

The disordered cognitions evidenced by eating disordered individuals ultimately leads to schema related, biased information processing that play a major role in the maintenance of the disorder. This occurs through selective attention or attentional biases to threatening material, which in the case of eating disorders is information pertaining to fatness. More particularly, in AN the feared stimulus is the thought of the self at an unacceptable (fat, obese) weight (Garner & Bemis, 1982). Fat related information is more likely to capture attention than neutral stimuli unrelated to this concern (Williamson, Muller, Reas, & Thaw, 1999).

1.6.2 Clinical, self-report and anecdotal evidence

Cognitive behavioural theories of eating disorders are key in the development of effective treatments. Of particular interest to the current work is the idea that disordered individuals preferentially orient towards, or selectively attend to information that is relevant to their area of concern, that is, weight and shape issues (schema-congruent information), and are resistant to information that is disconfirmatory to their beliefs and thoughts concerning weight and shape (schema-incongruent information; Vitousek & Hollon, 1990). It is important to look at the major sources of evidence for these claims. The purpose of such an exercise is to expand the existing knowledge base in this area of work and to improve on the methodology currently available.

Cooper (1997) carried out a review of the cognitive behavioural theories of Garner and Bemis (1982) and Fairburn, Cooper and Cooper (1986) in addition to two papers that made significant contributions to these theories (i.e. Guidano & Liotti, 1983 and Vitousek & Hollon, 1990). She highlighted the fact that much of the early evidence

for these theories came from clinical observations and anecdotes. Cooper believes that evidence gathered using this type of approach is problematic. The evidence was taken solely from clinical groups (and consequently, lacked a control group), therefore, rendering it impossible to say whether or not the observed weight and shape concerns were unique to this group or would extend to those who were dieting or suffering from depression. Cooper describes anecdotes as "inherently reactive" (p. 118), whereby individuals are responding to the current situation rather than expressing key underlying cognitions. The outcome of this dependence on anecdotes may mean that important factors inherent to the disease process are overlooked. The retrospective nature of clinical reports is also problematic as the client is expected to recall how they were feeling at salient points in their past. In addition, eating disordered clients are particularly subject to the deliberate distortion of information, either to protect their egosyntonic state or to appease those who they feel are in some way superior to themselves (Vitousek & Orimoto, 1993). Additionally, any conclusions based on anecdotal evidence depend greatly on the clinicians' interpretation of what they have been told.

A further source of early evidence for cognitive behavioural theories was derived from self-report questionnaires. Such questionnaires are often made up of a collection of self-statements based on ideas formulated as a result of the anecdotal evidence of clinicians sourced from client interviews. They may assess distorted cognitions, assumptions and beliefs relating to eating behaviours (e.g. The Eating Disorder Beliefs Questionnaire: Cooper, Cohen-Tovée, Todd, Wells & Tovée, 1997), or automatic thoughts about eating weight and shape (e.g. The Bulimic Thoughts Questionnaire; Phelan, 1987; and the Anoretic Cognitions Questionnaire, Mizes, 1990; Mizes &

Klesges, 1989). They then typically require the respondent to espouse or oppose each statement depending on how they feel it applies to their own personal situation or current thought. Results from studies that utilise these types of measure generally find that those with some degree of eating disordered symtomatology are greatly differentiated in their views regarding weight and shape concerns from normal, and to a lesser degree from dieting, obese and restrained eating controls (Vitousek & Orimoto, 1993).

Vitousek and Orimoto (1993) point out that, although the information gathered from self-report questionnaires is encouraging in terms of its support of ideas put forth by cognitive behavioural theory, there has been a lack of consideration of many conceptual and methodological issues.

Similarly to the problems inherent in interviews, denial and distortion are likely to occur when any group of people are being questioned by self-report questionnaire, particularly where the issues under consideration are of a personal or sensitive nature. Vitousek and Orimoto (1993) explain this distinctive feature thus:

> Because anorexics are typically invested in preserving their egosyntonic symptomatology, they are prone to deliberate, instrumental distortion in self-report (p. 201).

In addition, those with AN are distinctive in their tendency for over compliance, particularly to authority figures. Therefore, there is an increased likelihood that their answers may be cued or biased (no matter how subtle and unintended) by clinicians and researchers (Bruch, 1978). Vitousek and Orimoto (1993) illuminate an additional feature of those with AN – that of limited introspective capability, which worsened by the effects of starvation leads to further (non-intentional) distortion when trying to

communicate inner feelings and experiences. In general, all of these problems amass to minimize the validity of information derived using these subjective measures.

1.6.3 Relevance to the aims of the current work

A major aim of this present work is to examine more closely the mechanisms of any biases that exist in non-clinically disordered individuals with eating and body shape concerns and to determine an *implicit* means of testing for the existence of these biases. Vitousek and Hollon (1990) state that a major postulate of current cognitive theory relating to eating disorders is that the operation of weight and shape related schemata are responsible for the maintenance of eating disorder symptomatology. However, they believe that, although these schemas may act to maintain symptoms under the influence of inflexible core beliefs, the starvation syndrome and the effects of negative reinforcement, the possibility that they may act in a comparatively *automatic* fashion has not been explicitly explored. They state that the use of self-report data as a tool for assessing cognitive factors in the eating disordered individual, whilst being inherently more accessible to the researcher, are significantly less key in the examination of cognitive models of eating disorders. Cataloguing the weight and shape concerns as explicitly experienced by the disordered individual does not allow us to examine the operation of key schemata and how they work to maintain the disorder (Vitousek & Hollon, 1990). Williams, Watts, MacLeod and Mathews (1997) point out that: "a questionnaire cannot assess aspects of cognition of which the person is not aware" (p. xi). Their review of studies of non-conscious processing led them to conclude, "individuals are often not aware of the heuristics and biases that affect their everyday thinking, feeling and behaviour" (p. xi). This implies that there are many aspects of the individuals' psyche of which they are unaware but which may be crucial in the

understanding of their emotional problems. Therefore, it is clear that the use of questionnaires or interview procedures would not be an appropriate form of measurement to explore the stated aims of the present work. The following chapter will outline the most popular current methods used to assess biases of attention in the field of emotional disorders. It will acknowledge the lack of relevant research in the field of eating disorders and will suggest improved ways of looking at implicit biases in non-clinically eating disordered women.

CHAPTER 2

Implicit biases of weight and shape: some methodological considerations

2.1 THE BENEFITS OF STUDYING COGNITIVE ASPECTS OF EMOTIONAL DISORDERS

Most research in the area of information processing biases has been carried out in the field of anxiety disorders. Researchers in this field believe that the main function of the application of the cognitive processing approach to the study of emotional disorders is that it will augment current knowledge and understanding (Williams et.al., 1997; Beck & Clark, 1997). Beck and Clark describe the utility of such an exercise:

> the type of emotional information and the manner in which it is processed are crucial factors in the actiology, maintenance and treatment of anxiety disorders (p. 49).

It may be assumed therefore, that if such paradigms are seen as helpful in research in the field of anxiety, they may too be helpful in trying to explain other emotional syndromes such as eating or body image disorders. Vitousek and Hollon (1990) believe that:

> Methods and analyses derived from cognitive science should prove more informative in the study of cognitive operations in the eating disorders.....A worthwhile if modest goal for the design of such research is to confirm with 'non-obvious' techniques that eating disordered patients really are preoccupied with food and weight... (p. 198).

In terms of the current work, the aim is to confirm with such techniques that restrained and emotional eaters and dieters have these same preoccupations. What advantages can be derived from such new knowledge that will benefit the eating or body image disorder sufferers? Ainsworth, Waller and Kennedy (2002) affirm that the use of information processing paradigms in the field of emotional disorders has been key in the development of CBT such as that developed by Beck (1967) for the treatment of

depression. Similar treatments have been developed for the treatment of BN (CBT-BN), the first and most commonly used of which is that by Fairburn (1981). Indeed, The National Institute for Clinical Excellence (NICE), in their 2004 guidelines for the treatment and management of eating disorders, recommend CBT-BN as the first line of psychological therapy for the treatment of adults and adolescents (with appropriate age modifications) with BN. CBT-BED is similarly recommended for those with binge eating disorders (BED). They further suggest that it should be considered as a treatment option for individuals who have AN, although outcome studies for this form of treatment for this group are few and show equivocal results. However, Ainsworth et al. point out that studies that have looked at the effectiveness of such treatments in those with BN have found only modest remission or abstinence rates of around 57 % (see Craighead & Agras, 1991). And although Fairburn (1997) rightly argues that abstinence rates should not be looked at in isolation from the positive effects on self-esteem, and weight and shape concern, Ainsworth et al. believe that the use of methods taken from experimental cognitive psychology may be valuable in the modification and improvement of existing cognitive-behavioural models of BN. Therefore, we can see that a deeper understanding of the processes underlying disorders of eating, weight and shape is not merely a theoretical exercise. It may be useful in the development of more effective treatments both for eating disordered individuals and possibly for those without diagnosable eating or body image disorders but with excessive concerns in these areas. Treatments are particularly important in the latter group if concerns are impinging on their quality of life and their current health status.

2.1.1 A definition of automatic and strategic processing

Beck and Clark (1997) assert that of particular interest to psychopathologists who use the information processing approach in the study of anxiety is the question of whether or not automatic or strategic modes of processing play the dominant role in processing. They describe automatic processing thus: "effortless, involuntary and unintentional.....generally, outside of conscious awareness.....relatively fast and difficult to stop or regulate" (p. 50). Similarly, Williams et al. (1997) define automatic cognitive processes as involving; "a sequence of operations which are executed in an invariant manner, without the need for attention or conscious effort" (p. 40). They believe that the operation of these processes occurs through enduring arrays of associative connections that are inherent in the individual or are built up through an ongoing process of training or repetitive actions. Indeed, this associative network can be likened to the build up of weight/shape related schemata in eating disordered individuals. Vitousek and Hollon (1990) state that such schemata code information about "what it means to be thin or fat" (p. 196). They hypothesise that both those with AN and BN build up;

> a dense associative network between the construct "thinness" and such constructs as 'self-control', 'virtue', 'beauty', and 'intelligence' – and, conversely, between the construct 'fatness' and a great variety of personal faults and flaws (p. 196).

In addition, they believe that as the disease progresses, behaviour and cognitions become more stereotypical and habitual and that in the later stages of the disease it is only the more automatic processing effects that persist.

Vitousek and Hollon (1990) consider such associations to be down to the inherent nature of these meanings in the common culture (e.g. the vilification of fatness

and celebration of thinness) in addition to the learning history of the individual sufferer. It seems therefore, that the operation of these schemata does share some of the characteristics of an automatic process, and that further investigation is required in order to achieve a deeper and more complex understanding.

Strategic processes however, are characterised as temporary and volitional in nature (Williams et al., 1997). Beck and Clark (1997) describe strategic or controlled processes as being intentional, under conscious control, comparatively slow and more susceptible to regulation.

It is clear that if weight and shape related schemata are acting in an automatic manner to maintain disordered symptomatology, the sufferer may not necessarily be aware of them and will not be able to stop them occurring, thus these may go someway to explaining the invariant and inflexible behaviour demonstrated by the sufferer.

2.1.2 Cognitive science to the rescue

In order to ameliorate the problems encountered when using questionnaire or interview based methods to assess weight and shape based preoccupations, and to examine more closely their automatic nature, researchers in the field of eating disorders have begun to borrow techniques from experimental cognitive psychology. The advantage of many of the methods used by cognitive scientists is that they allow indirect measurement of a chosen variable. In addition, they may be used to tap into pre-attentive or sub-conscious biases in attention. Therefore, participants are generally unable to decipher the exact nature of the study, thereby substantially reducing the chance of falsification and distortion.

The use of experimental methods to study the operation of disordered schemata is not unique to the eating disorders. Hermans, Vansteenwegen and Eelen (1999) point

out that over the past 20 years the study of the way in which affectively valenced stimuli is processed by those with emotional disorders, has increased in popularity. Research into selective attention of such stimuli has become particularly prominent. Researchers who work in the area of depression, and in particular, anxiety are well practised in the use of experimental methods to further their understanding of the processes that underlie the operation and nature of the schema under investigation. Beck and Clark (1997) re-iterate this point:

> Over the past decade psychological theories, research and treatment of anxiety disorders have increasingly turned to information processing paradigms derived from experimental cognitive psychology and social psychology to understand the cognitive basis of anxiety (p. 49).

The uniting factor of all of these types of study is that those who are suffering from some sort of emotional disorder (e.g. generalised anxiety disorder, social anxiety or depression) all show a tendency to orient or selectively attend to information that is of primary concern to their particular disorder in preference to neutrally valenced material. For example, Mogg, Bradley and Philippot (2004) found that participants suffering from social anxiety disorder show an initial orienting bias towards threatening stimuli (angry faces). Mogg and Bradley (1999), and MacLeod, Mathews and Tata (1986) found a bias in attention towards angry faces and emotionally threatening words respectively in those with high levels of anxiety.

The weight and shape concerns experienced by those with an eating or body image disorder are certainly loaded with emotion. Davis (1986) describes the weight and shape related schemata of the eating disordered individual as being: "So hypervalent and laden with affect that they virtually control all aspects of the patients functioning" (p. 6).

Given the strong relationship between weight and shape related schemata and emotions it seems reasonable to believe that the methods used to explore anxiety and depression, could be applied to weight and shape related concerns.

2.2 ATTENTIONAL BIASES: DEFINING AND MEASURING THE CONCEPT

2.2.1 Defining attentional bias

Faunce (2002) believes that before the methods and outcomes of these methods can be adequately reviewed, it is important to first define what exactly is meant by the concept of attentional bias. Williams et al. (1997) provide a useful definition of the concept thus;

> ....attentional bias can be said to have occurred when there is a discrete change in the direction in which a person's attention is focused so that he/she becomes aware of a particular part or aspect of his/her stimulus environment (p. 73).

Faunce (2002) states that when emotionally salient material and material of neutral valence are placed in direct competition, bias can be said to have occurred if the emotional material is processed in preference to the neutral material. However, he believes that it is crucial to distinguish attentional *bias* from selective *distractibility*, which occurs when the simultaneous presentation of task irrelevant stimuli disrupts task performance.

Segal (1988) points out that in many of the studies that purport to measure schema content and mechanisms in depressed individuals "the effect of depressed mood may mimic the effects of an organised cognitive structure" (p. 154). He believes that unless the operation of schema and mood can in some way be separated, then accurate measurement of the mechanisms involved will be difficult. Therefore, he suggests that studies should aim to use dependent variables that reveal the underlying structure of schema autonomously from the strategies employed by participants in order to enhance

performance of the task demands/response. One task that claims to do this is the Stroop task (Stroop, 1935).

2.2.2 The Stroop task and eating disorders

In the original version of the task, participants are required to name the colour of the ink in which a word (usually that of a colour) or non-word (e.g. XXXX) is printed. Naming latencies are generally longer when the word and the colour in which it is printed are incongruent (e.g. WHITE printed in black ink) compared to when they match or when non-words are used. It is generally assumed that the activation of the word meaning interferes with the actual naming of that word. In order to use the task as a measure of disordered processing in psychopathological disorders; researchers have adapted the original task in to the form of an 'emotional Stroop'. Here, the words that are used are ones that are particularly salient to the disorder or population under investigation. So that for those with depressive illnesses the words may be negatively toned such as, useless, ineffective, and unhappy. Similarly, in anxiety researchers have used threat-related words such as death, harm, and fear. The outcome of such research generally reveals an interference effect or slower reaction times for naming the print colour of salient threat words compared to neutral or non-words. The effect is found only to hold true for those who have either been diagnosed with depressive illness or generalised anxiety disorders or those scoring highly on questionnaire measures of anxiety or depression. This has oft been interpreted as disordered individuals showing an attentional bias towards relevant stimuli.

Similar tasks that have been applied to eating disorders research have used weight and shape related words such as, plump, fat, hips and stomach. In addition, high and low calorie food words have also been used. It is generally found that for eating

disorders groups there is a significant bias towards relevant body weight/shape and food related stimuli. Dobson and Dozois (2004) carried out a meta-analytic review of 28 Stroop tasks that were specifically related to eating disorders. The tasks involved those with AN, BN, dieters/restrained eaters and control groups. They found that in general, those with BN showed an attentional bias/interference effect over a range of relevant stimuli. However, any significant biases evidenced by those with AN tended to only be for body weight/shape material. Results were less clear for non-clinical dieters and restrained eaters where no convincing biases were detected. They believed that the utility of the food Stroop task as a measure of group differences was questionable owing to its inconsistency in differentiating clinical from non-clinical groups across studies. They concluded therefore, that unless the food Stroop task was refined in some way the focus should remain solely on the body Stroop.

Lee and Shafran (2004) carried out a review of existing literature as it pertains to experimental measures of eating disorder related attentional bias. Within this review they looked at 27 eating disorder-related Stroop tasks. They concluded that findings for those with BN showed less cross study consistency than those for those with AN. However, the general pattern of results were similar to those described by Dobson and Dozois (2004), that is, in most cases of clinical eating disorder a bias towards eating disorder relevant stimuli was found. This was in contrast with those who were dieting, highly restrained or scored highly on measures of body dissatisfaction, where the results were equivocal.

2.2.3 The stroop task and problems of interpretation

Dobson and Dozois (2004) and Lee and Shafran (2004) both express concern over the utility of the Stroop task as a measure of the underlying mechanism involved in the

apparent information processing deficits found in eating disordered individuals. The problem is predominantly one of interpretation. There has long been, and continues to be, a debate as to the actual interpretation of the interference effects found in the Stroop task. As far back as 1969 Treisman was expressing concern over the use of the Stroop task as a measure of selective attention as it necessitated that participants selectively attend to more than one characteristic of a lone stimulus rather than a number of stimuli at a time. In addition, Faunce and Job (2000) believe that it is equally credible that interference effects are owing to participants directing attention away from or towards a particular group of stimuli. Rieger et al. (1998) agree, they think that the task is a "weak test of attention" and that because the direction of attention is difficult to assess "a conceptual leap is required to suggest that longer color-naming latencies reflect attentional biases toward a given class of stimulus" (p. 200). Eysenck (1992) posits that it is possible that the observed interference effects are a result of '*selective distractibility*' rather than attentional bias per se, a process that he defines as a disruption of task performance by the simultaneous presentation of stimuli unrelated to the main task. He believes the two processes although related, to be different facets of attentional operation. Finally, Lee and Shafran speculate that the effect may equally be a result of a mood congruent attentional bias or cognitive avoidance.

In addition to these conceptual issues, a number of methodological problems have been noted that relate particularly to psychopathology, and more specifically to eating disorders. Williams, Mathews and MacLeod (1996) caution that the attentional bias may be as a result of the frequency to which particular patient groups are exposed to specific types of material – or the practice or 'expertise' effect. That is, it is possible that the usage frequency of the words used in Stroop tasks is different for disordered and

control groups. Jones-Chesters, Monsell and Cooper (1998) believe that even if the frequency of word usage of particular salient word groups were measured in for example, eating disorders groups, it would be impossible to explicitly assess the incidence of the words in the thoughts or ruminations of an individual. In addition, there has been a great deal of variety in the way in which stimuli has been presented. Whereas some studies have used a blocked presentation of words, others have mixed presentations of neutral and disorder relevant words and yet others single word presentations. This makes comparisons problematic. Jones-Chesters et al. (1998) in a study of bulimic individuals, found not only that the effect of eating disorder related words was exaggerated when word presentation was blocked, but that this effect carried over to other general non-disorder relevant emotional words. Although this group did find an interference effect when words were presented individually, the effect was less than that of the blocked presentation. However, as no one standardised set of eating disorder related words has been used throughout all of the studies carried out, it is unclear whether or not specific words are having a particular influence on the end result. Alternatively, significant results in blocked presentation may be owing to an accretion of arousal and/or anxiety leading to impaired general cognitive function (Lee & Shafran, 2004; Jones-Chesters et al.). A related problem that is particularly found in eating disorders research is that weight and shape words are often intermixed with food related words to give a 'global' measure of eating disorder concerns. However, as was pointed out earlier in the present review, when presented in separate experiments the two types of stimuli often gender differential results, with the utility of the 'food Stroop' as a measure of attentional bias actually being called into question by Dobson and Dozois (2004). The results for each type of stimuli are also found to differ depending on the

classification of the eating disorder. Lee and Shafran believe that each class of stimuli represent different facets of disorder related psychopathology and that intermixing the stimuli "prevents individual concerns and biases from being revealed" (p. 229). They also point out that there is greater consistency in the results when stimuli are combined compared to when they are presented in separate experiments. Faunce (2002) agrees that with 'global' eating disorder measure (i.e. food and weight stimuli combined), it is difficult to draw firm conclusions, as it is impossible to elucidate the specific agency of the interference.

A further problem mooted by both Lee and Shafran (2004) and Faunce (2002) that is specifically associated with eating disorder related material is that of mode of presentation and method of reaction time (RT) measurement. Words have been presented on cards and by computer or tachistoscope presentation. Similarly, RTs have been measured using a stopwatch, voice activation and via button press. Lee and Shafran and Jones-Chesters et al. (1998) point out that block presentation of stimuli on cards combined with stopwatch measurement is problematic and rather rudimentary. They believe that superior temporal precision can be gained by presenting one word at a time. In addition, it has been found that in studies that use button press, responses have proved more reliable than voice activation of response and result in lower levels of interference.

It is clear that the Stroop task is a weak measure of attentional bias. More specifically, owing to the difficulty experienced in the interpretation of results, for example disentangling attentional avoidance from attentional bias, it is limited in its utility to adequately define the underlying mechanisms involved in the attentional process. It is because of these conceptual shortfalls that researchers have increasingly turned to more sophisticated and transparent measures of attention.

2.2.4 The visual probe task – a more precise measure

Given the shortcomings of existing methods, MacLeod, Mathews and Tata (1986) were motivated to develop a measure that would more directly measure the distribution of visual attention. In the original task participants were presented with two word stimuli simultaneously on a computer screen (one above the other). On critical trials, one word was emotionally threatening and the other of neutral valence. The stimuli remained on the screen for 500 ms and immediately on their termination a small 'dot' probe would appear (on some trials only), in the spatial location of one of the words. Participants were required to acknowledge the presence of the probe by pressing a button on a hand held box as quickly and as accurately (i.e. withhold a response on non-dot trials) as possible. The latency to respond to the presence of the probe was taken as a measure of visual attention. More specifically, the researchers were able to determine the direction of any bias towards or away from the stimuli of interest. Using this method it was predicted that anxious individuals would show speeded responses to probes that appeared in the spatial location of emotionally threatening stimuli. This prediction is based on the findings of Posner, Snyder and Davidson (1980) following investigations into the allocation of attention following valid and invalid cues. They concluded that RTs would be facilitated to locations where attention had been previously cued. Therefore, in the context of the dot probe task, it is assumed that if an individual were cued to a particular location (owing to the emotional saliency of a particular stimulus), then they would be faster in detecting probes that subsequently appeared in that location.

One advantage of this task is that reaction times are derived from responses to a neutral target (the probe) and are not dependent on interference effects. This therefore limits the problem of response bias, a major limitation of the Stroop task (Macleod et al.,

1986). Secondly, the task is directional in that it allows a discrimination to be made between avoidance of and vigilance towards a particular stimulus. Finally, MacLeod et al. devised a formula that allowed them to assess the degree and direction of bias towards the stimuli of interest. This involved subtracting reaction times for congruent trials (threat and probe in the same location) from those for incongruent trials. The resultant index could have a positive or negative value. Positive values indicated a bias towards or vigilance for the threat-related material whereas; negative values were suggestive of an avoidance of this material.

This method of measuring attentional biases has become increasingly popular in many fields of psychopathology, particularly so in the field of anxiety related disorders. The general finding for individuals with generalised anxiety disorders (GAD) and those with high scores on measures of trait anxiety is that they consistently appear to show increased vigilance for threat-related material. This is the case for threat words (e.g. MacLeod et al. 1986) and threatening pictures (e.g. Mogg & Bradley, 1999: threatening faces), non-selected children and adults high in trait anxiety and children with clinical anxiety (Waters, Lipp & Spence, 2004; fear related pictures). Less consistent results are found for those with state as opposed to trait anxiety, but the picture is generally the same. Similar results have been found when more specific anxiety types have been identified, for example, clinical social phobia (Mogg et al., 2004; threatening faces) and panic disorder (Kroeze, & van den Hout, 2000; cardiac information). The dot probe has also been used to study those with drug dependence (Lubman, Peters, Mogg, Bradley & Deakin, 2000; drug related images), heavy alcohol consumers (Field, Mogg, Zetteler, & Bradley, 2004; alcohol images) and chronic pain sufferers (e.g. Asmundson, Carlton, & Ekong, 2005; sensory and affective pain words).

Given the widespread use and success of the dot probe in a wide variety of different areas, it would seem an obvious choice of method for those in the eating disorder/body image field. However, this field has been slow to adopt the procedure as a means of further elucidating the mechanisms involved in biases of attention. This is particularly surprising since the outcome of CBT for those with eating disorders is not yet reaching satisfactory levels. Cooper (2005) has pointed out that this may be owing to therapies being based on models that are not sufficiently sophisticated. She believes that current models will have to undergo a process of refinement if cognitive behavioural therapies are to become more effective.

The Stroop task is still being used by many in the field of eating disorders both to further elucidate attentional processes and as a measure of treatment effectiveness (e.g. Carter, Bulik, McIntosh & Joyce, 2000; Ball et al., 2004; Stormark & Torkildsen, 2004 and Davidson & Wright, 2002). Only one published study to date has specifically addressed attentional mechanisms in eating disorders using a visual probe task. Rieger et al. (1998) used a visual probe task in order to investigate the nature of attentional biases in eating disordered individuals. A comparison group of restrained and unrestrained eaters were used. The eating disordered group consisted of 16 participants with BN and 16 with AN. The control group were a 32 psychology undergraduates divided into restrained and unrestrained eaters using a medium split (score greater than 15) on Herman and Polivy's (1980) revised restraint scale (RRS). Previous tasks looking at attentional biases in eating disordered individuals have predominantly used only negatively valenced body words. However, as Rieger et al. pointed out, Vitousek and Orimoto (1993) had previously expressed concern that concentrating solely on negatively valenced stimuli would lead to only a restricted knowledge of body image-

related processing. Therefore, Rieger et al. chose to use both positively and negatively valenced material. Twenty each of negative (e.g. FAT) and positive (e.g. THIN) related body image words were paired with a neutral category words (common household objects (e.g. TABLE). They were presented for 500 ms and then followed by a probe that could appear with equal prevalence in the position of one or other of the words. They found a trend towards eating disordered participants directing their attention away from positive and towards negatively valenced body image words. They took this as support for Vitousek and Orimoto's notion that eating disordered individuals selectively attend to information that is schema congruent (evidence for fatness) and away from schema incongruent information (evidence for thinness), a bias that they believe leads to over concern with body shape and weight and fear of developing an undesirable (overweight) shape or weight.

Placanica, Faunce and Job (2002) carried out a similar study using non-clinically-disordered psychology undergraduates scoring highly on the drive for thinness and body dissatisfaction subscales of the Eating Disorders Inventory-2 (EDI-2; Garner, 1991). More specifically, they conducted a study to investigate the effects of hunger on attentional biases towards high and low calorie food words and negative and positive body image related words. Whilst significant results were found in relation to the effects of hunger on biases towards food words, no interaction or main effects were found for high inventory scorers, for negative or positive body image-related words. The authors believed that this might partly be owing to the nature of the stimuli used. They felt that for non-clinical populations stimuli of a more potent nature, such as images or photographs of bodies might be required in order to elicit an effect. They believed that using such stimuli would serve to "magnify the salience of body shape/weight

information..." (p. 89). Similarly, Boon, Vogelzang and Jansen (2000) looked at biases of attention in a group of 59 women divided by virtue of a medium split on the restraint scale (RS; Herman, Polivy, Pliner, Threlkeld & Munic, 1978). The stimuli used were general body weight/shape words (no division into negative and positive was used) and food words. No significant interactions or main effects were found. The authors discussed the findings in terms of Wegner's ironic process theory (1994) that states that in order for an individual to avoid particular thought contents they must first focus on these stimuli. Therefore, Boon et al. believed that it was equally possible that some participants may be looking towards the stimuli whereas others would be looking away from the same stimuli. This would have the effect of cancelling out any overall effects.

2.2.5 Word stimuli: ecologically valid or arbitrary symbols?

It is equally probable however, that the Boon et al. (2000) study suffered from the same stimuli-related problem as Rieger et al. (1998). That is, that word stimuli were not emotionally intense enough to elicit a response in these non-clinical individuals. Other researchers have likewise discussed the pitfalls of using word stimuli (see section 2.2.3).

Bradley, Mogg, Falla and Hamilton (1998) believed that one of the major limitations of research into anxiety-related attentional biases up to that point had been the over-riding dependence on single word stimuli. Additionally, the range of threat value associated with word stimuli is considered to be comparatively weak and restricted and the ecological validity limited (Bradley et al. 1998; Mogg & Bradley, 1999). Bradley, Mogg and Millar (2000) state that single words "are not representative of naturalistic, anxiety provoking stimuli" (p. 790). Furthermore, Bradley et al. (1998) maintained that once the relevant meaning had been drawn from the stimuli, the remaining word properties were of limited value to the assessment of threat. They

believed the advantage of pictorial stimuli was that they held the possibility of providing further information to the viewer. Similarly, Yiend and Mathews (2001) state that the problems with words are that they "may not vary sufficiently in affective intensity" (p. 666). In addition, Bradley et al. (1998) felt that using pictorial stimuli would negate the confound of heightened subjective word usage frequency of salient words in particular client groups. Similarly, Bradley et al. (2000) considered the threat word to be a symbol whose meaning is unreliable, variable and subjective in meaning. Likewise, Roelofs, Peters, Fassaert, and Vlaeyen (2005) believe that words act only as "semantic representations" (p. 299) of the threatening stimulus, whereas pictures enable the individual to "directly visualize the feared stimuli" (p. 299). In summary, Mogg and Bradley (1999) believe that the use of word stimuli results in an incomplete picture of attentional bias for emotional material.

2.2.6 Integrating theory with current ideals

The knowledge generated from previous research in the area of attentional biases in emotional disorders was used to develop an improved methodology for the present series of studies. Firstly, given the methodological, conceptual and interpretative problems encountered by those who have used the Stroop task, it was decided that this would not be a suitable method for use in the present series of studies. Therefore, the more precise visual probe task was taken as an initial measure of attentional biases in non-clinically eating disordered women. Secondly, the use of words appears problematic, particularly for non-clinical populations. It seems that if biases are to be found and explored in the current population then a more naturalistic set of stimuli must be used. Images of 'real' women were therefore chosen as the stimuli for the subsequent set of studies.

2.3 MAIN AIMS AND OBJECTIVES OF THE CURRENT RESEARCH

The following set of studies use methods borrowed from experimental cognitive psychology in order to more adequately explore the nature of implicit weight and shape concerns in young female women who may be at risk from developing more serious eating-related problems. More specifically, the current work aims to achieve the following objectives:

Pilot Work

- To obtain a 'gold standard' set of pictorial stimuli for use in a series of studies that aim to explore attentional biases.

Studies 1 to 4

- To look for the presence and to explore the nature of any weight and shape related attentional biases in a group of highly restrained and emotional eaters and weight loss dieters.

It is expected that the following research questions will also be addressed:

- Will those existing at a lower place on the eating disorder continuum (namely dieters, and high-restrained and emotional eaters) show qualitatively the same pattern of weight and shape related biases as those with clinically diagnosed eating disorders?
- Will any observed biases be owing to increased vigilance or attentional avoidance?
- Will the presence of weight and shape related biases lend further support for the continuity perspective, and the lack of bias support for the discontinuity perspective?

- What are the implications of the findings for current theories relating to eating disorders, the treatments derived from them and the possibility of effective preventative programs?
- How can we utilise cognitive methods more efficiently in order to more accurately define the attentional mechanisms underlying disordered eating behaviour? That is, what future work can follow on from the current findings?

2.4 ETHICAL APPROVAL

Advice regarding the wording of consent and information sheets was sought from the Department of Medical Ethics at The University of Bristol.

All of the studies carried out in the current thesis were individually appraised and subsequently approved by the ethical committee of The Department of Experimental Psychology at The University of Bristol.

CHAPTER 3

The development of a 'gold standard' set of body-image stimuli

3.1 INTRODUCTION AND RATIONALE

The aim of the present thesis was to explore the nature of attentional biases in non-clinically eating disordered females. In order that this could be carried out, it was essential that a 'gold standard' set of pictorial body image stimuli were derived. Previous studies of this type tend only to obtain ratings (e.g. threat value or appropriateness to named categorisation) from a small number of people, often colleagues, who are not necessarily representative of the participants who will subsequently take part in the attentional bias tasks. Following much consideration, it was decided that the stimuli obtained for use in later tests of attentional bias should first be rated in terms of size and pleasantness, by a group of women who would be representative of those taking part in future studies. Therefore, it could be at least in part assumed that the ratings obtained for the stimuli would apply not just to the initial rating group but also to other women of the same age group, body mass index (BMI), and degrees of weight and shape concern.

3.1.1 The 'best' type of stimuli

Many factors were taken into consideration when deciding on the best type of stimuli to use in the current series of studies. Requirements for the body stimuli were as follows: the participants needed to be able to make judgements regarding the shape and size of the *body* of the woman they were seeing and not be influenced by extraneous variables that may have masked these variables. Pictures of women fully clothed may have resulted in the female participants making judgements on the basis of the clothes worn

rather than the body of the women to which they were being exposed. As well as covering up the body, the appropriate choice of everyday clothing can make a larger figure look slimmer and a thinner figure look larger than they really are. In addition, many of the features of a woman's body that are known to be desired or loathed particularly by those with body image concerns or eating disorders can be masked by clothing. For example, the sight of ribs or protruding hipbones are often admired and desired (or are reported to be so) by those with eating disorders and body image concerns. Moreover, catwalk models and actresses when portrayed in the media are often seen to flaunt their extreme thinness.

It is difficult to conceptualise the meaning of what it is to be 'fat', but being fat may not just mean having a BMI that is above average. For many, 'being fat' may mean a lack of tone, or 'flabbiness', it may mean the presence of cellulite or dimpled and misshapen body parts in addition to an obviously larger than average body size. Therefore, it was decided that pictures of women in swimwear would allow pertinent body parts to be available for assessment and would provide participants with an ecologically valid set of stimuli. It was presumed that such images may be typical of those readily available in women's clothing catalogues and those portrayed in the general media and may be representative of the variety of shapes and sizes seen on the beach or on holiday.

3.1.2 Locating the stimuli

The images were downloaded from Internet swimwear catalogues. It is accepted that it may have been preferable to invite 'real' women to be photographed, as this would have allowed the possible confounds of different coloured and types of swimwear to be overcome (by providing the same coloured swimwear to all). However, the process

would have been costly in terms of time and money well beyond the means of the present study, and would possibly constitute a major project in itself. In addition, it is not usual in everyday life to see others around us that are dressed uniformly. Therefore, it could be considered that by using the 'internet' women we are providing participants with the type of women they may be likely to see in their everyday lives. It is fully recognised however, that by using 'real' women, measurements of BMI could have been controlled.

The decision to use household objects as the neutral stimuli was owing to the popularity of this category in word-related visual probe procedures used in other studies investigating biases in high and low eating disorder inventory scorers, high and low restrained participants, eating disordered participants and high and low hunger groups (Placanica et al., 2002; Boon et al., 2000; Rieger et al., 1998, and Mogg et al., 1998). This allows results of the present set of studies to be comparable to these related studies without the confound of vastly different neutral categories.

Participants were drawn predominantly from a university population in order to keep the profile as close as possible to the expected test population of subsequent studies.

3.2 METHOD

3.2.1 Participants

Twenty female participants took part in the present study. The mean age of the participants was 25.5 years (SD = 5.75 years, age range = 18 – 38 years). Participants were recruited both by poster advertisements around the University of Bristol campus and Students Union, and through opportunistic sampling. Fourteen of the participants were students (undergraduate and postgraduate) at the University of Bristol; the

remainder were both employees of the University as well as outside agencies. Participants were awarded £5 on provision of informed consent and completion of the study. Participation was on a voluntary basis and assigning each participant a code number ensured anonymity. All participants had normal or corrected to normal vision.

3.2.2 Measures

3.2.2.1 Self-report questionnaire measures

A single 5-sided questionnaire booklet was administered to the participants. It consisted of the following scales that were considered to be relevant when measuring responses to the characteristic features/properties of the body image images under examination.

1. ***Body Shape/Weight Concerns***

(a) The **Drive for Thinness (DT)** and **Body Dissatisfaction (BD)** subscales of the **Eating Disorders Inventory-2** (EDI-2; Garner, 1991).

Items on the DT subscale assess excessive concern with dieting, preoccupation with weight and fear of weight gain. The BD subscale measures dissatisfaction with the overall shape of the body and with the size of those regions of the body that are of greatest concern to those with an eating disorder (stomach, hips, thighs and buttocks). A recent study has shown that internal consistency for each of the two scales is high, with alphas of 0.84 and 0.92 for DT and BD respectively (Espelage et al., 2003).

Each of the two subscales is measured on a 6-point Likert scale. Each item within the subscale consists of a belief statement or question and participants are required to indicate the frequency to which the statement applies to them by circling one of the following responses: *always, usually, often, sometimes, rarely* or *never.* The resultant responses are then transformed through a recoding procedure. Scores from the

6-point scale are recoded so that they fit a 4-point scale. This scale ranges from 0 – 3, with the three least symptomatic responses being awarded a score of 0 and the three progressively more symptomatic responses being awarded scores of 1, 2, and 3 respectively. Low scores indicate a low measure of that subscale and high scores a more symptomatic profile. Some of the items are negatively stated in order to control the response set. Scores for these items are typically reversed so that high scores again, indicate a high measure of that subscale.

DT is measured using seven items, for example, "*I am terrified of gaining weight"* and "*I am preoccupied with the desire to become thinner".*

BD is measured using nine items, examples include; "*I think my stomach is too big"* and "*I feel satisfied with the shape of my body".*

2. *Dieting Behaviour*

Participants were asked to confirm on the consent form (see appendix 1), whether or not they were currently on a weight-loss diet using the criteria laid down by Cooper and Fairburn (1992a). The criteria was defined as follows:

Dieters – must have;

> been making an attempt to lose weight for at least 4 weeks i.e. following a 'standard reducing diet' and/or setting definite dietary rules concerning a calorie limit, when to eat or what foods should be eaten (p. 363).

Non-Dieters – were those not presently attempting to lose weight for at least 4 weeks.

Within the questionnaire booklet, participants were asked to note down the length of time they had been on their present diet if appropriate and the number of diets they had been on during the past 12 months. They were also asked to indicate by marking a tick

box, if they had never been on a diet in their lives (using the criteria described above).

The weight and height of each of the participants was measures in

order to obtain a measure of Quetelet's BMI (BMI = $\frac{\text{Weight (Kg)}}{\text{Height (m}^2\text{)}}$).

3. Hunger

Hunger Scale (Grand, 1968)

In order to ascertain whether or not hunger played a role in the way that participants rated the stimuli, a measurement of hunger was included. Previous studies that have investigated the role of hunger in the processing of body shape/weight stimuli have found no effect (Placanica et. al., 2002). However, they used word stimuli that may not have been strong enough to elicit an effect.

The hunger scale by Grand (1968) was used as a measure of the participants' subjective level of hunger. This scale has been used in previous studies of this type (e.g. Mogg, Bradley, Hyare & Lee, 1998; Placanica et al., 2002), and was therefore thought suitable for use in the present study.

Four items are included in this scale as follows:

i. number of hours since last eating (estimated to the nearest 15 minutes)
ii. subjective level of hunger right now from 1 (not hungry at all) to 7 (extremely hungry).
iii. estimation of the amount of food that could be eaten right this minute on a scale from 1 (none at all) to 6 (as much as I could get).
iv. time until next meal (estimated to the nearest 15 minutes)

In addition to these items a further item that measures the subjective level of satiety was also used. It was thought that the level of fullness might affect the way that participants viewed the body image stimuli and the way in which they felt about their

own bodies, which in turn may have affected the answers given on the body dissatisfaction scale. The item was adapted from a measures used by Friedman, Ulrich and Mattes (1999) and Lowe, Friedman, Mattes, Kopyt and Gayda (2000) as follows: *Please rate how full your stomach feels right now* on a scale from 1 (not at all full) to 7 (extremely full).

4. ***Demographic Information***

This section of the questionnaire asked each participant questions relating to their personal circumstances, for example, their date of birth, marital status, and occupation.

3.2.2.2 Body rating task

The Stimuli

(a) Body Stimuli

One hundred and five images of women modelling swimwear were downloaded from Internet swimwear catalogues (a full list of the sources of these images can be seen in appendix 2). These included both catalogues supplying 'normal' sizes, (e.g. 8 – 16 UK sizing), as may be found in most high-street outlets, and those purporting to supply swimwear for plus/out size women (e.g. 12 – 30 UK sizing).

(b) Household Objects

Seventy-six images of common household objects (e.g. an armchair, table, pillow) were downloaded from Internet homeware catalogues (see appendix 2 for sources).

Preparation of Images

All of the image manipulation was carried out on an Apple Macintosh G4 powerbook (Apple computer inc. 1983-2004) using Adobe Photoshop Elements 2.0 for

Windows and Macintosh (Adobe Systems Incorporated 2002) and a Wacom™ tablet and pen (Wacom company Limited). The images were all in colour (256 colour palette). All of the images used were resized to approximately the same dimensions (700 x 900 mm) with an on-screen resolution of 28.35 pixels per cm (72 pixels per inch). The images of women and household objects were 'cut out' from their respective backgrounds and all placed on a neutral grey (50% grey) background to avoid the chance of any response bias owing to objects in the background scene (e.g. such as sea and beach related paraphernalia). In addition, any distracting objects on the woman's person, such as sunglasses, scarves and hats were removed from the image scene again, to limit the chance of response bias. All of the women were depicted facing forward in a front-on position.

The Body Rating Task

The rating task was created using E-prime version 1.1.4.1 (Psychology Software Tools, Inc.). The task was run on IBM compatible Intel® Pentium (r) III personal computers (Eclipse Max Systems) running Microsoft® Window 98®. The images were displayed on 15-inch Trio 3D colour monitors (S3 Inc.), with resolutions of 800 x 600 pixels, with an optimal refresh rate of 75khz. Responses were made on standard 101/2 keyboards.

Design

With much due consideration, it was decided that the neutral pictures would not be rated in the present study. Pictures of household objects are generally believed to be 'neutral' in terms of emotional valence, and were therefore not expected to elicit any strong emotions in the participants, so were considered to be suitable for use in attentional bias

tasks as a neutral control against the body images. In addition, none of the studies previously mentioned that have used this category of objects as neutral fillers or control words have measured the valence of the category.

Therefore, only the body images were rated in the present study. They were rated on the following two dimensions:

1. ***Ratings of Size*** – In order to attain two clear groups of 'fat' and 'thin' body images, it was necessary to obtain ratings of body shape/size from the group of participants. Therefore, the participants were asked to rate the size of the bodies on a scale from extremely thin to extremely fat on a 7-point Likert scale.
2. ***Ratings of Pleasantness*** – in order to elicit a measure of valence for the body images, without directly eluding to attractiveness, a measure of pleasantness was used. The word pleasant was used as it sums up the emotion of pleasure or 'gratification of the senses, delight or satisfaction' (Encarta® World English Dictionary © 1999 Microsoft Corporation). Therefore, participants were asked to the rate the pleasantness of the shape of the bodies on a scale from extremely pleasant to extremely unpleasant on a 7-point Likert scale.

Timings and Randomisation of Body Stimuli Presentation.

A central fixation point was displayed in the centre of the VDU for 500 ms prior to presentation of the body image. This was to ensure that the participant was attending to the area of the screen in which the body image would subsequently be displayed. Directly on the offset of the fixation point, a single body image was displayed in the centre of the screen; this remained on the screen for 500 ms. This display time was used in order to match the timings that would be used for image presentation in subsequent

visual probe studies. Immediately following the image presentation, a screen appeared asking the participant to rate the bodies on either pleasantness or size, this remained until the participant had made a keyboard response.

The order in which the participant received either the size or the pleasantness ratings task was randomised across all of the participants.

Procedure

On arrival at the testing lab, all participants were provided with an information sheet detailing the procedures involved in the present study (see appendix 3 for an example). A verbal explanation of the study was also given. The participants were then given the opportunity to ask questions. Once the participants were happy with the information they had been given and had agreed that they would like to continue with the study, they were asked to read and sign the consent form. Again, they were instructed to read the consent form carefully before signing and to ask if there was any aspect of the form or the study they were unhappy about. Once consent had been given, each participant was led to a private booth and sat at a distance of approximately 57 cm from the monitor. They were informed that the instructions for the task would appear on the starting screen, and that once they were happy with what they were being asked to do, they could press any key to begin the main task. Once the participant indicated that they had completed the first ratings task, the next task was initiated. Once both rating tasks had been carried out, each participant was given a copy of the questionnaire booklet to complete. Finally, each participant was brought to a private room in order that weight and height measurements could be taken. All participants were given the opportunity to opt out of the weighing component if they felt that this would cause them distress in any way. Following this, the participant was given a copy of the debriefing information sheet informing them of

the nature and purpose of the study (see appendix 4). They also received a short verbal explanation of the study and were given the opportunity to ask any questions regarding the study or issues raised by the study. A leaflet detailing useful contacts relating to eating disorders specifically, and mental health more generally, was given to each participant (see appendix 5). This was thought necessary in case, on reflection, any participant felt that they would like to talk to or contact someone about any of those issues. The participant was then thanked for taking part and paid £5.

3.2.3 Data analysis

Following her test session, one participant reported that she was a 'recovering' anorexic; however, as her data did not result in any outliers, they were retained in the main data set. All of the data were assessed in order to ensure they met the assumptions for parametric analyses. Any data found to exhibit either positive or negative skew were transformed using logarithmic (base 10 and base 10 +1) transformations on positively skewed data and arcsine transformations on negatively skewed data.

Classification of Participants by Lifetime Dieting Status

Given that only a small proportion of the participants in the present study reported that they were currently on a diet, no further analyses were carried out based on the division between current dieters and non-dieters. Similarly, only a small number (5) of participants stated that they had been on a diet in the past 12 months, so again no analyses were carried out on the basis of 12-month diet history. Instead, lifetime history of dieting was used as a basis of division of the participants. As a majority of the participants were under 25 years old, it was assumed that a lifetime history of dieting would be referring to some point during the past 10 years. Using this division, eight of

the participants reported having been on a diet at some point in their lives ('lifetime dieters'), whereas 11 participants reported never having been on a diet in their lives ('lifetime non-dieters'). One participant failed to report her lifetime dieting history and subsequently was left out of further participant analyses.

3.3 RESULTS

3.3.1 Group characteristics – questionnaire variables

Means and standard deviations were obtained for each of the measured variables and a series of univariate ANOVAs were carried out in order to explore any differences that may be present between the two dieting groups. The results are displayed in Table 3.1

Table 3.1 – Means (Standard Deviations) of Questionnaire Variables for Lifetime Dieters and Lifetime Non-Dieters

Measure	Lifetime Dieters (N = 8)	Lifetime non-dieters (N = 11)	F Value	P Value
Age (years)	25.8 (7.3)	25.7 (4.9)	< 1	> .1
BMI	22.6 (3.8)	21.5 (2.5)	< 1	> .1
Last ate (min)	427 (336)	125 (71)	7.82	.014
Hungry now	4.5 (1.1)	4.1 (1.6)	< 1	> .1
Next Meal (min)	93 (45)	147 (96)	1.70	> .1
Food now	4.7 (1.6)	3.5 (1.6)	< 1	> .1
Fullness	2.8 (1.2)	3.3 (1.4)	1.56	> .1
EDI – DT	10.6 (5.8)	3.7 (6.2)	6.14	.024
EDI - BD	12.8 (7.8)	5.3 (5.1)	6.48	.021
EDI - Total	15.6 (7.9)	6.7 (6.7)	7.08	.016

Details of Dieting Behaviour

Four participants were currently on a diet as defined by Cooper and Fairburn (1992a). Of these one reported having been on a diet for 4 weeks, one for 24 weeks and another reported 'always being on a diet'. One dieter omitted to say how long she had been on her current diet. Five participants reported having been on a diet in the last 12 months; two of these had been on two diets and three on one diet. It is important to note however

that some of these participants reported being on a diet 'all of the time', and therefore, one diet may have lasted the whole 12 months.

Analysing Participant Characteristics

There were no significant differences between the ages or BMIs of the two groups.

Looking at the hunger variables (Table 3.1) it can be seen that lifetime dieters reported a significantly longer time since last eating compared with the lifetime non-dieters. However, Levene's statistic showed that the variances of the two groups were not equal ($F(1,15) = 53.66$, $p = 0.001$). Therefore, a Mann-Whitney U analysis was carried out on the data. This confirmed the significant difference between the two groups ($U = 14$, $p = 0.04$). No further significant difference were found for any of the other measured hunger variables.

Finally, lifetime dieters were found to exhibit significantly higher levels of body dissatisfaction and drive for thinness than lifetime non-dieters. Total EDI-2 scores were also significantly higher for the lifetime dieters.

3.3.2 Analysing body image characteristics

Defining the Groups

A bi-variate correlation was carried out in order to assess the relationship between pleasantness and size. A highly significant positive association was found between body size and pleasantness of body-shape as rated by the participants ($r = 0.94$, $df = 109$, $p < 0.001$). This indicates that as the body size of the rated bodies increased, the more unpleasant the participants rated the shape of the body. This is illustrated in figure 3.1

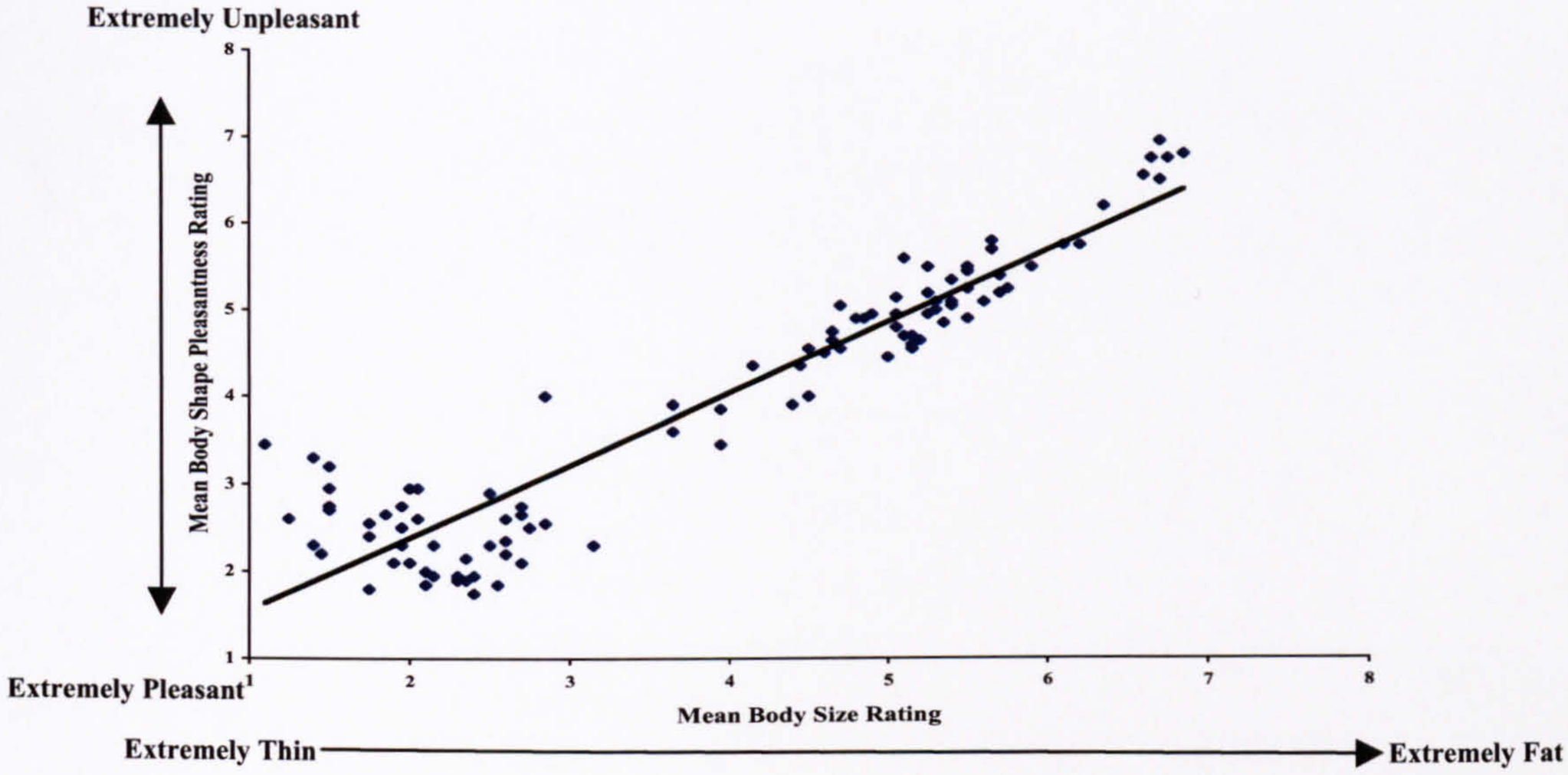

Figure 3.1 – Correlation of body size on pleasantness of body shape (all images)

It was evident that the images scoring lower on the size dimension were viewed as more pleasant than those scoring higher on the scale. However, it was also apparent that those images scoring between 1 and 1.5 on the size dimension (i.e. may be classed as extremely thin) were deemed less pleasant than the majority whose scores ranged between 1.5 and 3. It may be was that these 'extremely thin' women had a unique set of characteristics that set them apart from the majority of thin images. The concern was that if used in subsequent studies, these images might confuse the outcome. Therefore, a series of regression analyses (of pleasantness on body size) was carried out on these data with outliers of more than 2 SD from the mean being removed at each stage. Eighty body image pictures remained following the series of regression analyses. Figure 3.2 demonstrates the pattern of the relationship between the two variables following the regression analyses.

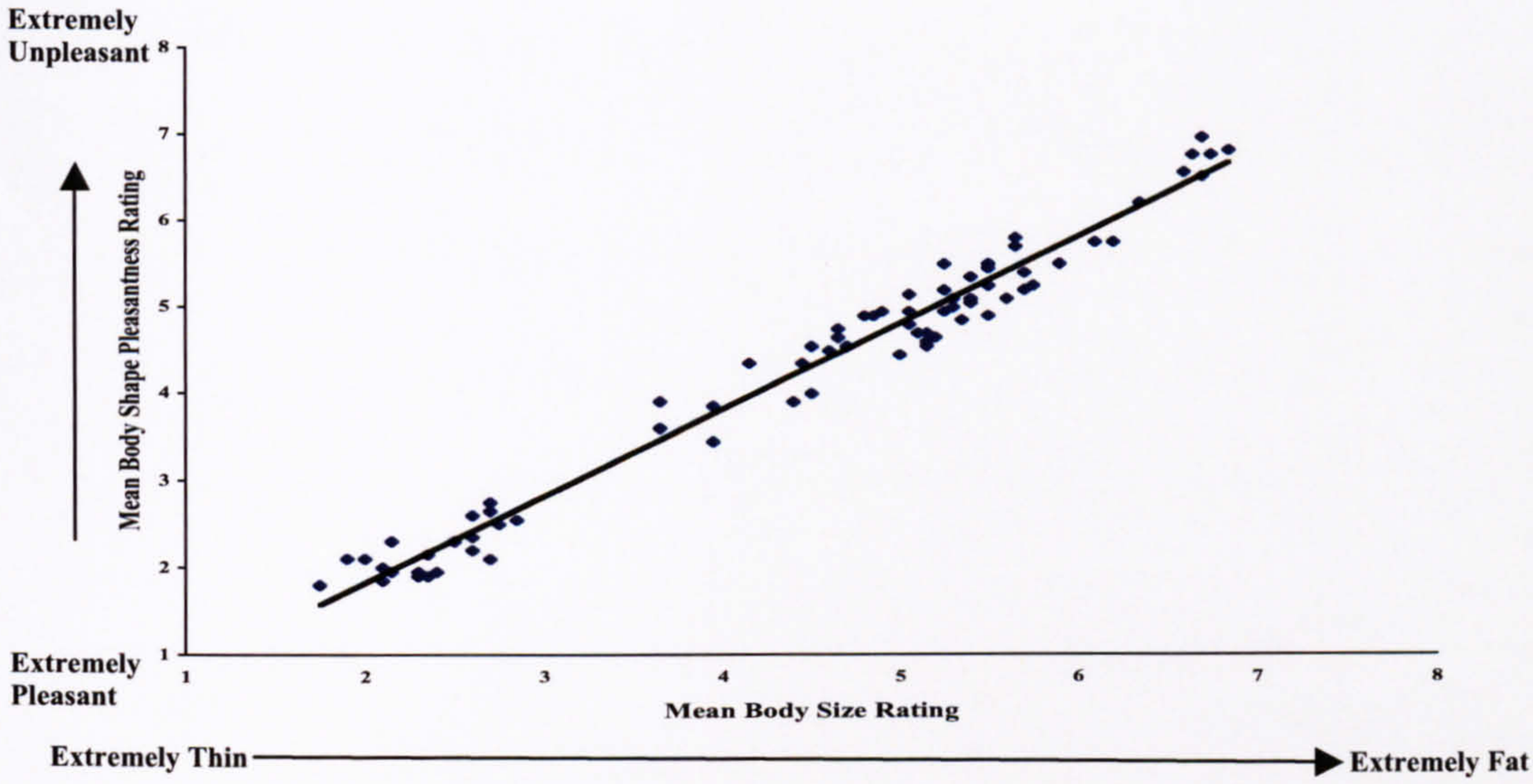

Figure 3.2 – Correlation of body size on pleasantness of body shape following regression analyses

It can be seen that the 'extremely thin' group have been eliminated, leaving only those scoring between 1.75 and 2.85 on the size scale. In addition, two clear 'clumps' of data can be seen to emerge; a group at the lower end of the scale, that could be considered 'thin' and a second, more widely spread group. This was thought to be a mix of 'medium' and 'fat' sized images. In order to obtain the final twenty 'fat' and 'thin' images, a tripartite split of the remaining images was carried out. Therefore, the groups were divided as follows:

Lowest through 4.15999 = 'Thin'

4.16 through 5.35 = 'Medium'

5.35001 through 7 = 'Fat'

As only 'fat' and 'thin' groups were required for the present series of studies, the 'medium' group were discarded, leaving 53 'fat' and 'thin' images. Of the remaining images, the best 20 were chosen on the basis of;

i. Clarity of image

ii. Lack of distractibility (compared with the other images), for example, women with more sombre swimwear would be chosen over brightly, patterned swimwear.

iii. Those facing front-on were chosen over those standing sideways or posing in some other way (e.g. hands in the air, or obviously leaning on something).

Owing to the difficulty of obtaining a large number of appropriate 'fat' images, some repeats of the same woman were necessary. However, in order to match this, the same number of 'thin' models was repeated. In order to lessen the impact of the repeats and to reduce the chance of them being recognised as repeats, the women were seen modelling different types and styles of swimwear and, where possible, wore their hair in a different style. Some representative examples of each of the groups are illustrated in figures 3.3 and 3.4. The full set of body images can be seen in appendix 6.

Figure 3.3 – Representative examples of the 'fat' images

Figure 3.4 – Representative examples of the 'thin' images

3.3.3 Analyses of responses to 'fat' and 'thin' images

1. Utility of the Images as Two Separate Groups – Size Ratings

Do lifetime dieters rate the size of the body images differently from lifetime non-dieters?

A two factor mixed samples ANOVA with body size rating (fat vs. thin) as the within subjects factor and lifetime dieting history (lifetime dieter vs. lifetime non-dieter) as the between subjects factor, revealed a main effect of body size. That is, both lifetime dieters and lifetime non-dieters rated the 'fat' images as larger in the size than the 'thin' images ($F(1,17) = 520.83$, $p < 0.001$), confirming the utility of the images as two separate 'fat' and 'thin' groups. No significant interaction between lifetime dieting status and body size rating or overall effect of lifetime diet status was evident ($F < 1$). These results are illustrated in figure 3.5.

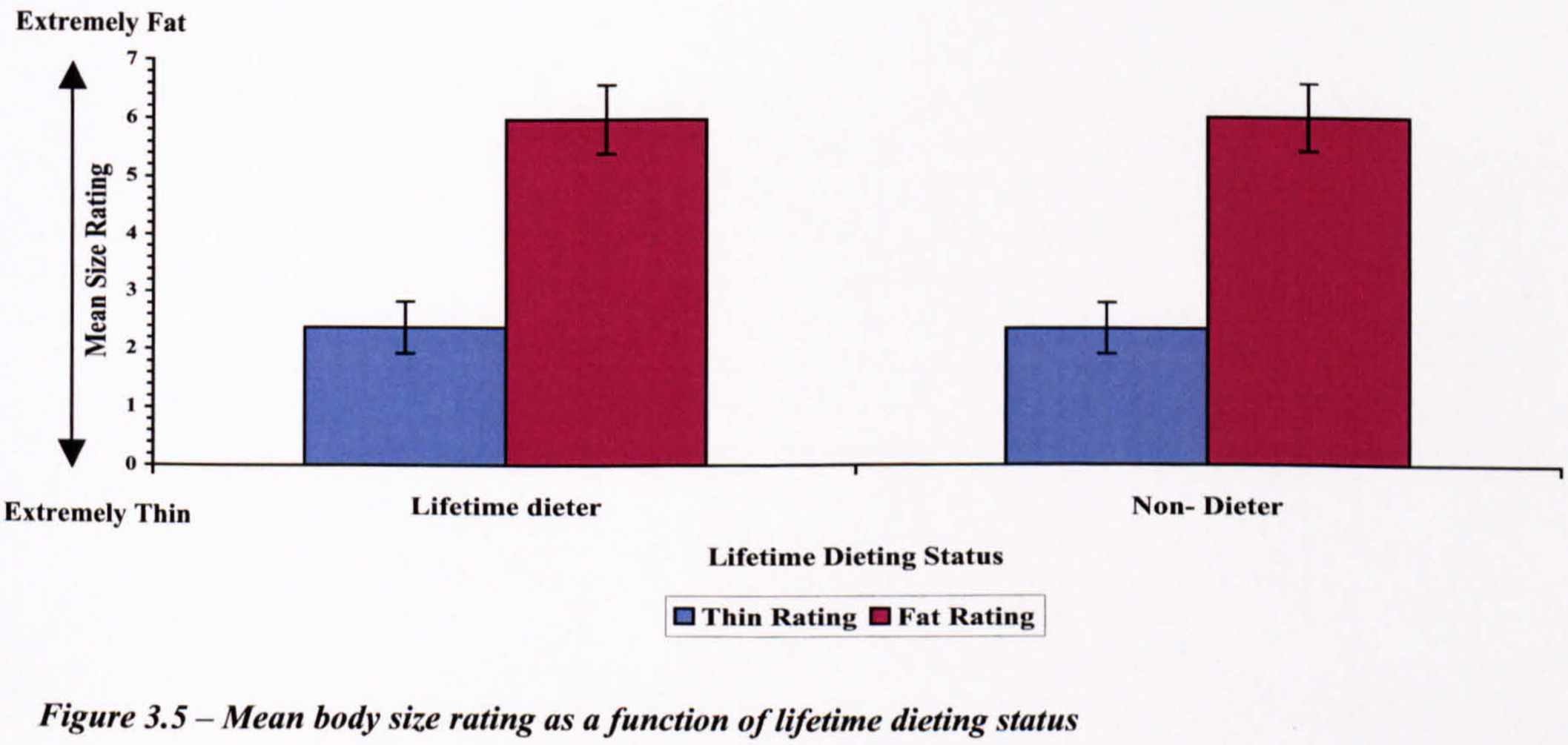

Figure 3.5 – Mean body size rating as a function of lifetime dieting status

3. Utility of the Images as Two Separate Groups – Pleasantness Ratings

A two factor mixed ANOVA with body type (fat vs. thin) as the within subjects factor and lifetime diet status (lifetime dieter vs. lifetime non-dieter) as the between subjects factor was carried out. This indicated that there was a significant overall effect of body type, with 'fat' bodies being rated significantly more unpleasant than 'thin' bodies ($F(1,17) = 144.07$, $p < 0.001$). No significant overall effect of lifetime diet status or interaction effect with lifetime dieting status was found ($F < 1$). These results are illustrated in figure 3.6.

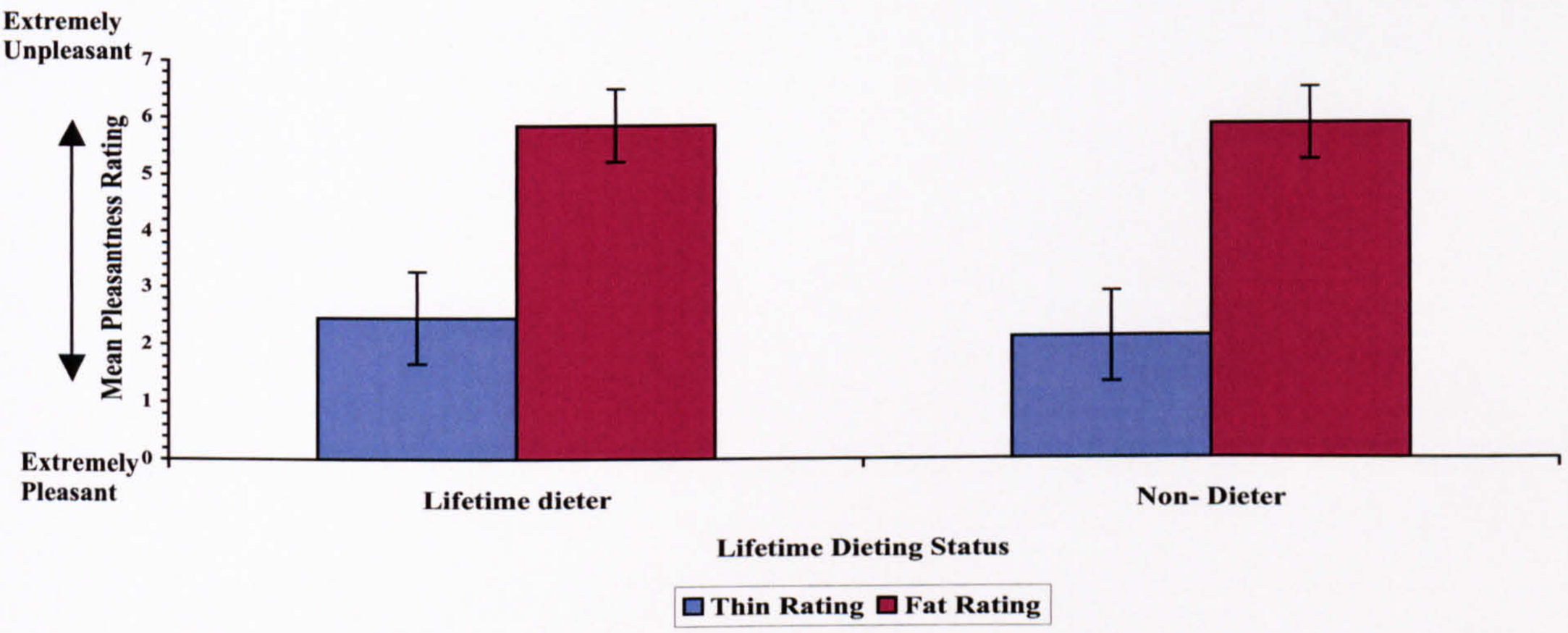

Figure 3.6 – Mean body pleasantness rating as a function of lifetime dieting status

3.4 DISCUSSION

3.4.1 The utility of the fat and thin groupings

The main purpose of the current study was to obtain a 'gold standard' set of female body images for use in subsequent studies measuring attentional biases. This aim was achieved and the resulting set of stimuli was suitably divided into groups that represented both 'fat' and 'thin' categories. Apart from this main aim however, some additional interesting findings were revealed and will be discussed in the following sections.

3.4.2 Beauty, attractiveness and pleasantness – interchangeable meanings

One interesting, but not altogether surprising finding was the fact that as the size of the body of the imaged women increased the rating of pleasantness of size decreased. Although, the concept of attractiveness was not used as a descriptor in the ratings task, it is likely that the women in the study were using the two terms interchangeably. The fact that the concepts of physical attractiveness and beauty are often used in an interchangeable fashion has already been discussed in section 1.1. It is therefore equally as possible that the same process was occurring in the present task, with pleasantness, attractiveness and beauty being considered as one and the same concept. This may be even more likely given that the concept of pleasantness is not frequently used as a descriptor when talking of the physical appearance of objects or people. However, it has been used in other studies of this type. This may have served to confuse the participants and future studies may consider reverting to the use of 'attractiveness'.

If this is the case, it is even more intuitive that the ratings of pleasantness decreased with increasing body size. As discussed in section 1.1, Etcoff in the Dove™ report (Etcoff et al., 2004) stated that the diversity of the concept of beauty had become

so restrictive that it was represented by images of "*ethereal weightlessness*" (p. 4). Similarly, Orbach in the same report talked about the narrowing of the beauty aesthetic to one where beauty was represented by the physical attributes of 'tallness' and 'thinness'. It is not difficult to see then why a group of young females raised in a culture such as this would rate larger women as less pleasant to look at than the images of thinner women.

Related to this is the idea that fatness is linked to feelings of negativity and or that not 'being thin' will lead to negative or unpleasant consequences. This was illustrated well by Fairburn (1995) who used a quote from a female with BN to convey the link between weight gain and unattractiveness. To this woman physical attractiveness meant being thin. The state of fatness (which could actually mean a 'normal' weight) would for her, lead to a "bleak and lonely" (p.55) future. Similarly, in section 1.6 cognitive behavioural theories of eating disorders were seen to explain the meaning of fatness to the disordered individual. Fatness is seen as 'feared' state and thinness as having "inestimatable worth" (Garner & Bemis, 1982). In the same way Vitousek and Hollon (1990) talk about the complex associative networks built up by those with eating disorders between thinness and a series of positive attributes one of which is beauty. It should not be assumed however that such networks are solely the domains of those with clinical eating disorders. It is clear from the Dove™ report that these associations are culturally driven and are inherent in the majority of women. Whilst conducting this task many of the women stated that although they felt uncomfortable doing so, they had rated the 'fatter' women as less pleasant than the thinner women. Obviously, this association does not sit comfortably with many of us; unfortunately the propensity to think in this way appears almost automatic or inherent in

the current societal climate. This inextricable link between pleasantness (and attractiveness) and the idea of thinness and fatness displayed by the participants in this study may suggest that the stimuli carry some degree of emotional meaning for them. Certainly, this is the case for clinically disordered individuals according to Davis (1986). He describes weight and shape related self-schemata as being "affect ridden" and "hypervalent" (p. 33) in nature. This sort of connection, when in its extreme, leads to automatic biased processing such as that evidenced by eating disordered individuals on Stroop and visual probe tasks described in sections 2.2.2 and 2.2.4.

In summary, it appears that the stimuli in the present study have the characteristics necessary to initiate biased processing in a group of non-clinically disordered weight and shape concerned women.

3.4.3 The differential definition of dieting

A further issue raised by the current study is the problem associated with the definition of dieting. It would have been preferable to use current dieting status rather than lifetime history of dieting. This would have given a clearer insight into the current behaviour of the women and how this related to the measured feelings about their bodies and to the motivation to diet. However, the women with a lifetime history of dieting still had a significantly greater degree of body dissatisfaction and drive for thinness than those who claimed that they had never been on a diet. They also stated that they had gone without food for a longer period of time prior to testing than had the lifetime non-dieters, although this did not seem to impact on the level of hunger that they were experiencing in comparison to the non-dieters. If dieting is always motivated by body dissatisfaction in this group of lifetime dieters, it is likely to manifest itself more strongly at times when

the individual feels particularly vulnerable (e.g. when under stress), and it is at this time that they may be increasingly motivated to diet.

The women in the study reported that they found it difficult to decide whether or not they were actually on a diet. This was surprising given that the definition, described initially by Cooper and Fairburn (1992a; see section 3.2.2.1), sets out quite a clear picture of rules on which to base a decision. Many of the women seemed almost reluctant to admit they were 'on a diet' and appeared to feel more comfortable with saying that they were watching what they ate. However, this differential is in concurrence with previous research discussed in section 1.3.4. It appeared from this research that the prevalence of dieting was dependent on the way in which the question was phrased. In particular, Wardle et al. (2000) stated that when asked to report whether or not they were trying to lose weight, 36 per cent of women agreed. However, when Hoare et al. (2004) and Gregory et al. (1990) included the word 'dieting' or 'diet' in their question, the figures drop to 17 and 12 per cent respectively. It is therefore essential for any study that intends to use 'dieting' as a factor for investigation, that both researcher and participant know exactly what is meant by 'dieting'. An even better approach would be for the researcher to give the participant a choice of dieting possibilities. The participant may be asked if they were restricting food (or dieting) in order to lose weight, whether they were dieting in order to maintain weight whether or if they were *watching* what they ate in order to maintain weight. This would serve to break down 'dieting' behaviour and give a clearer overall picture of the effect each of the behaviours have on the variable under investigation.

In conclusion, the stimuli generated by this study were deemed appropriate for use in subsequent studies. The first study in the series (see Chapter 4) aims to look for

the presence of weight and shape related biases in a group of women who score highly on measures of restraint and emotional eating using a pictorial visual probe task. The next study (Chapter 5) will use the same task to look at women who are dieting to lose or watch their weight.

CHAPTER 4

Exploring the nature and direction of weight and shape related attentional biases in highly restrained and emotional eaters by use of a pictorial visual probe detection task

4.1 BACKGROUND AND RATIONALE

A review of cognitive behavioural theories relating to eating disorders and the methods used to test them was provided in sections 1.6 and 2.2. The following section serves to summarise the existing evidence, and outline the rationale for the first main study of this thesis.

Cognitive behavioural theories relating to eating disorders maintain that dense associative networks are built up by eating disordered individuals, around the issues of weight and shape and their meaning for that individual. These disordered schemata are responsible for aberrant processing of incoming information that is related to these concerns. This in turn results in disordered individuals preferentially processing information that is congruent to their current concerns and avoiding information that is incongruent to these concerns.

Traditionally, evidence for these theories has come from clinical anecdotes, interviews and self-report methods, all of which are problematic in nature. Later studies in this field took the lead from anxiety researchers who had begun to borrow techniques from cognitive experimental psychology, recognising that a more empirical stance would potentially lead to a more accurate account of the mechanisms that underlie information processing biases in individuals with emotional disorders. In the field of eating and body image disorders the favoured method of exploring these biases has been through the use of the emotional Stroop task. This has typically shown that those with

clinically diagnosed eating disorders show preferential processing for eating and shape related stimuli in preference to stimuli considered to be of neutral valence. Results for non-clinical individuals with eating or body image concerns have shown equivocal results. However, as pointed out in section 2.2.3 the Stroop task is subject to methodological, conceptual and interpretative problems. It is because of this that those in the field of anxiety research have moved on to use more direct measures, the most popular of which is the visual probe detection task. This has the advantage of allowing researchers to explore the direction of attentional biases. Only one published study to date has used this method to assess weight and shape related biases in those with clinically diagnosed eating disorders (see Rieger et al., 1998). Rieger et al. also highlighted the fact that previous eating disorder-related studies had placed an undue emphasis on negatively valenced material. The main exception to this were Sackville et al. (1998) in their disorder-related Stroop task, where stimuli were divided into high and low calorie words and fat and thin body image categories. They found that individuals with AN (but not high-restrained individuals) showed interference for both thin and fat-related words. Rieger et al. therefore incorporated both positively and negatively valenced word stimuli into their task. In contrast to Sackville et al., the eating disordered participants in the Rieger et al. study showed a bias towards schema congruent (fat-related words) and away from schema incongruent (thin-related) stimuli. This study served the purpose of emphasising the limitations of previous studies that have combined fat and thin related information into one inclusive category of 'eating disorder related concerns', where subtle differences like this may be missed. Sackville et al. explained their results by pointing out that those with AN are known not just for their fear of fatness but also for their *drive for thinness* (e.g. see Bruch, 1978). A similar study

carried out by Placanica et al. (2002) on non-clinically eating disordered individuals, failed to show any evidence for biases of attention towards disorder related material. They believed that this might be owing to the nature of the stimuli used. More specifically, they suggested that the use of word stimuli in non-clinically disordered individuals was problematic because they may not be powerful enough in terms of affect to elicit a response. They therefore suggested using pictorial stimuli. Further problems with word stimuli have been discussed in section 2.2.5. Again, those in anxiety related research have been advocating the use of image based or pictorial stimuli for 7 or 8 years and have found biases not only in those with generalised anxiety disorders but also those with non-clinical manifestations of anxiety (see section 2.2.4). Unfortunately, research looking at biases of attention in eating disorders continues to lag far behind that of anxiety and its related disorders. This is particularly worrying given that theory based CBT, the most popular therapy for BN and BED, still does not show wholly satisfactory levels of abstinence or remission (see section 2.1).

A further limitation of bias related research is that it has predominantly looked at the operation of attentional deployment when emotionally valenced stimuli are placed in direct competition with material of neutral valence. Mackintosh and Mathews (2003) believe that whilst information derived in this way is valid and interesting, pairing stimuli with negative and positive valence in the same display "should provide a better test of any underlying attentional differences" (p. 633). They generally found that emotional-neutral pairings resulted in slower responses to valenced material in general (i.e. both negative and positive material); but placing negative and positively valenced material in direct competition provided differential results. More specifically, they found that positively valenced material was preferentially processed over the negative material

(or that there was avoidance of negative material). They believed that slower responding to valenced material in valenced-neutral pairings was indicative either of spatial avoidance of such material or to the valenced stimuli taking up increased strategic processing resources (interference). However, they felt that both of these explanations were inadequate when trying to explain the result obtained when two differentially valenced stimuli were placed in direct competition. This was further compounded by results obtained when they paired more intensely negatively valenced pictures with neutral pictures. This resulted in *faster* reaction times for the highly negatively valenced material, rather than avoidance as had occurred with the more mildly valenced material used previously. Mackintosh and Mathews sought to explain the current outcome by suggesting that avoidance of mildly valenced stimuli may not be owing to its aversive qualities per se. Rather, they propose that in some cases inhibition occurs. This serves to impede disruption to any ongoing cognitive task ensuring that efficient task performance is maintained. Their model proposes that when attention is concentrated on a task that requires cognitive effort, an inhibitory mechanism is initiated in order to impede the tendency to direct attention towards a distracting threatening stimulus. However, they suggest that this occurs only when the stimuli are of a mildly threatening nature and that this explanation is similarly applicable for stimuli that are mildly positively valenced. Mackintosh and Mathews suppose that it is only when the stimuli are emotionally impactive at a level that exceeds a precise threshold, will attention be directed towards these stimuli. Similarly, when two stimuli of opposing valence are placed in direct competition, the more negative stimuli will be considered the more distracting of the two and hence are more likely to be inhibited.

The chosen method for the present study was based on the preceding evidence. Therefore, a visual probe task using pictorial stimuli was considered to be the most useful method for investigating the nature and direction of biases in non-clinically disordered women. In addition to threat-neutral pairings, it was considered relevant, in view of the Mackintosh and Mathews (2003) data, to include a condition that placed two valenced stimuli in direct competition.

The term restraint is often used interchangeably with that of dieting and both of these are considered by many to lie midpoint on the eating disorders continuum. Therefore, in this first study a measure of restraint will be used as an indication of non-clinically disordered eating. In addition to a measure of restraint, a measure of emotional eating will be taken. No published studies have so far looked at the effect of emotional eating on implicit weight and shape-related cognitions. Therefore, a further aim of this first study was to appraise the nature of attentional processing in highly emotional eaters.

A second study (see Chapter 5) will examine the effects of weight-loss dieting and weight maintenance on weight and shape related attentional biases. The following prediction was made for the initial study in this series.

- ❖ High-restrained (but not low-restrained) eaters will show a bias towards schema congruent ('fat'-related) stimuli in preference to neutral stimuli or schema incongruent ('thin'-related) stimuli.

As no current studies have investigated the effects of placing fat and thin stimuli in direct competition with one another, no direct predictions will be put forward for the outcome of such a pairing. Instead, this condition will serve an exploratory function with a view to giving a more comprehensive insight into the processing of body related stimuli. Likewise, as no such studies have been carried out on emotional eaters, no firm

prediction will be offered regarding the nature and direction biases of attention towards body related stimuli.

4.2 METHOD

4.2.1 Participants

Thirty-five female participants took part in the present study. The mean age of the participants was 20.9 years (SD = 3.3 years, age range = 18 – 35 years). Participants were made up of undergraduates from The University of Bristol. They were undertaking either a single or joint honours degree in psychology or were studying psychology as an open unit. All of the participants were recruited through the experimental hours scheme in the Department of Experimental Psychology. This scheme offers undergraduates studying psychology a range of experiments by which they can gather the allotted number of experimental hours credit as required by their particular course of study. All participants were awarded 1 experimental hours credit on provision of informed consent and completion of the study. Participation was on a voluntary basis, and assigning each participant a code number ensured anonymity. All participants had self-reported normal, or corrected to normal vision.

4.2.2 Measures

4.2.2.1 Self report questionnaire measures

A single 13-sided questionnaire booklet was given to the participants. It consisted of the following scales that were considered to be relevant when measuring biases in attention toward body-related images.

1. Body Shape/Weight Concerns

(a) The **Drive for Thinness (DT)** and **Body Dissatisfaction (BD)** subscales of the **Eating Disorders Inventory-2** (EDI-2; Garner, 1991).

Information pertaining to this questionnaire is identical to that already outlined in section 3.2.2.1.

(b) Degree of Subjective Overweight (DSO; Tiggemann, 1994).

The participants were asked to propose an ideal weight (in whatever measurement they were most familiar with). This weight was then converted to kg (if necessary), subtracted from their actual weight (kg) and then expressed as a percentage of their current weight. Tiggemann (1994) states that the resultant percentage provides a parametric measure of the participant's subjective idea of how overweight they believe themselves to be.

2. Dietary Restraint

(a) The Revised Restraint Scale (RRS; Polivy, Herman & Warsh, 1978).

This scale comprises 10 items measuring restrained eating behaviour. Factor analysis has shown the scale to be made up of two separate subscales assessing both of the following dimensions: Weight fluctuation (WF) and Concern for dieting (CD), (Herman & Polivy, 1975). Studies have shown the scale to have a satisfactory level of internal consistency ranging from $\alpha = 0.78$ ($n = 60$; Laessle, Tuschl, Kotthaus & Pirke, 1989), to $\alpha = 0.82$ ($n = 901$; Allison, Kalinsky, & Gorman, 1991).

The **WF** scale is measured by 4 items, and asks the respondent to indicate the degree of weight fluctuation that has occurred within a specified time period, and the amount of weight the person believes himself or herself to be over their desired weight.

The following examples illustrate the type of questions and response categories that operationalise this subscale. *In a typical week, how much does your weight fluctuate (in pounds)? 0 - 1 1.1 - 2 2.1 - 3 3.1 - 5 5.1 +* and *How many pounds over your desired weight were you at your maximum weight? 0 - 1 2 - 5 6 - 10 11 - 20 21 +*. The most minimal weight category is given a score of 0; progressively higher weight fluctuations/gains etc. are given scores of 1 – 4 depending on the number of categories within that item. Summing the scores of all of the items and obtaining the mean score derive an overall score for the subscale.

The **CD** subscale is made up of 6 items that measure the respondents subjective concern for dieting and weight gain. Items within this subscale typically ask the respondent to indicate the degree or frequency that a particular eating behaviour or weight concern applies to them by circling a worded response such as; *Never, Rarely, Often, Always* or *Not at all, Slightly, Moderately, Extremely*. Questions asked within this subscale include; *Do you give too much time and thought to food?* and *Would a weight fluctuation of 5 pounds affect the way you live your life?* As in the WF subscale, lower scores are given to the less frequent occurrence of the behaviour and concern for dieting and higher scores for more frequent manifestations. Scores range from 0 – 3 or 4. A mean of all of the items within the subscale is taken to obtain an overall concern for dieting subscore. An overall total score that involves the summing the scores from the two subscales can be obtained to give an indication of overall restraint. Alternatively, the subscale scores can be used in isolation.

(b) The Dutch Eating Behaviour Questionnaire (DEBQ; van Strien, Frijters, Bergers, & Defares, 1986).

This measure comprises three scales that purport to measure restrained, emotional and external eating styles. It has been shown to have a stable factor structure across a variety of participant categories such as gender, pilot samples, differing weight categories, and clinical groups (Allison et al., 1992; Wardle, 1987). This stability has remained across subsequent revisions, and in addition its factor structure has been replicated successfully in a British population (n = 188; Wardle, 1987). Allison et al. have shown it to have a test-retest reliability of 0.92 and a Cronbach's alpha of 0.95, indicating a high level of internal consistency.

The three scales are measured on a 5-point response scale. Each item within the subscale consists of a question relating to a behaviour or feeling experienced in a particular circumstance. Participants are required to indicate the frequency of the behaviour or feeling as it applies to them in the given circumstance by circling one of the following responses: *Never, Seldom, Sometimes, Often, Very often.* A score of one is given to a 'never' occurring response and a score of 5 is given to an occurrence marked as having occurred 'very often'. One of the items is negatively stated and requires a reverse scoring procedure to be adopted. Some of the items have an additional response 'not relevant' for those situations where it is possible for a participant never to have experienced the situation under question. Where this response is chosen, the item is not included in the final calculation of mean score for that subscale.

DEBQ – Restraint scale (DEBQ-R) – This comprises 10 items and is measured by questions such as; *When you have put on weight, do you eat less than you usually do?*

and *How often do you refuse food or drink offered you because you are concerned about your weight?*

DEBQ – Emotional Eating Scale (DEBQ-E) – The normal response to negative emotion or arousal is a loss of appetite. However, for some the opposite is true and often they resort to excessive eating (van Strien et al.) This subscale is made up of 13 items for example, *Do you have a desire to eat when you have nothing to do?* and *Do you have a desire to eat when you are depressed or discouraged?*

DEBQ – External Eating Scale (DEBQ-X) – Generally, this behaviour is defined as "eating in response to food-related stimuli, regardless of the internal state of hunger or satiety" (van Strien et al; p. 296). This subscale is made up of 10 items for example, *Can you resist eating delicious foods?* and *If you see others eating, do you also have a desire to eat?*

Wardle (1987) carried out a validation study on the DEBQ using a British sample. She found the results to generally follow much previous work carried out in both the clinical and experimental fields. Namely, she found that had those with BN scored highly on the *emotional* eating scale followed by women who were attending a dieting club. Those with AN however, did not differ significantly from normal female controls. For the *external* eating scale the same pattern was revealed, with individuals suffering from BN scoring highly on the scale and those with AN obtaining low scores. The *restraint* scale scores revealed that the clinical groups scored more highly than non-clinical groups. However, no differences between the clinical groups for this subscale were found.

(3) Dieting Status and Behaviour

Measures of dieting status and frequency were appended to this section in order to assess the extent of dieting in each of the participants and their reason for dieting. The definition of weight-loss dieting was that used by Cooper & Fairburn (1992a) and has already been outlined in section 3.2.2.1 (dieting behaviour).

The participants were given four choices in response to the question: "Please tick the answer that describes you now". The response statements were taken from examples used by two sets of authors who carried out dieting related surveys on US and UK adults. The given choices were as follows: *I am not currently dieting; I am currently dieting to lose weight; I am currently dieting in order to keep my weight where it is right now* (from French, Jeffery, & Murray, 1999) and *I am currently watching my weight to avoid putting on weight* (from Wardle, Griffith, Johnson & Rapoport, 2000). In addition, if the participants had stated that they were on a diet, they were asked to note the time duration of their present diet. Participants were also asked how many times they had been on a diet in the past 12 months and to state approximately how many times in their life they had been on a diet. The weight and height of each of the participants was measured in order to obtain a measure of BMI. They were also asked to state their ideal weight.

4. *Control*

The Shapiro Control Inventory (SCI; Shapiro, 1994)

The SCI is made up of 9 separate scales plus an additional set of refinements to the item level of these scales that question the respondent in more depth about the construct under investigation. In total, the SCI is made up of 187 items and is purported to provide a "multi-faceted, multi-dimensional control profile of an individual" (Shapiro, 1994, p.

v). Previous scales that profess to measure control concentrate predominately on locus of control (e.g. Rotter, 1966; Wallston, Wallston & DeVellis, 1978). Shapiro, Blinder, Hagman, & Pituck (1993) believe that locus of control is merely one facet of this multi-faceted, multi-dimensional concept. Similarly, other researchers have noted that early studies using measures that focus on locus of control have failed to reach an unequivocal conclusion regarding the importance of 'general' control in the life of the eating disordered individual (Surgenor, Horn & Hudson, 2003; Surgenor, Horn, Hudson, Lunt & Tennent, 2002). Surgenor et al. (2003) believe that a greater variability in control may be evidenced with the advent of "third generation" (p. 293) measures such as the SCI.

The present study used only 8 of the 9 scales with none of the special refinements. The following constructs were measured; Overall sense of control, positive sense of control, negative sense of control, desire for control, positive assertive mode of control, negative assertive mode of control, positive yielding mode of control and negative yielding mode of control. A brief overview of each construct is given below along with 5-week test-retest reliability. These data are taken from Shapiro (1994). Shapiro presents a series of twelve studies in his manual that verify the construct, face and criterion validity for each of the scales. The scale has been validated across a variety of psychiatric/medical populations (e.g. Shapiro, 1994; and Surgenor et al., 2003).

(a) ***Overall sense of control (scale 1).*** This is a 16-item scale that measures a person's subjective perception of whether or not they have control of their current life situation. In addition, it assesses the individual's perception of their ability to gain and maintain control. By combining the scores of the positive and negative sense of control scales (scales 2 & 3) an overall positive sense of control score is derived. Both of these scales are made up of a series of belief statements that relate to various aspects of

control. The participant is asked to indicate the frequency to which they believe a given statement applies to them by circling one of seven possible responses as follows: *Never, rarely, occasionally, sometimes, often, very often and always.* A response of *Never* is given a score of 1, and a response of *always*, a score of 7. All items within each of the constructs of control (positive and negative) are summed and divided by the number of items in each of the constructs. In order to obtain an overall sense of control score, items on the negative sense of control scale must first be reverse scored, and then added to the overall score for the positive sense of control score and then divided by 2. This scale was shown to have an $\alpha = 0.89$ and a 5-week test-retest $r = 0.83$ (Shapiro, 1994).

(b) ***Positive Sense of Control Scale (scale 2)***. This scale comprises 11 items. It assesses the respondents perceived level of self-efficacy as it relates to gaining and maintaining control (if that is what is desired), and the ability to use adaptive measures in order to attain control. In addition it asks the individual to evaluate six dimensions of positive control – "ability to set meaningful goals, skills to carry out the goals, motivation and determination to follow through, awareness, choice and responsibility" (Shapiro, 1994, p.19). Examples of statements used to operationalise this construct are, *I have a positive sense of control in my life* and *I am able to set clear, realistic and meaningful goals.* A high score on this construct indicates a high sense of positive control.

(c) ***Negative Sense of Control Scale (scale 3).*** This scale is made up of 5 items. It measures the individuals perception of whether or not they have lost or are losing control over particular aspects of their lives where they previously felt that they had control, whether they are overly controlled by others, and the degree to which they feel passive and helpless in their current life situation. The following statements exemplify

the assessment of these aspects of control; *I am too passive and helpless* and *I lack control of my environment (other people, situations).* A high score on this construct indicates a high level of negative control.

(d) ***Desire for Control Scale (scale 9)*** This scale consists of 11 items and assesses the degree of motivation associated with the individual gaining (and maintaining) a sense of control or power over their own life, that of other individuals and situations within their life (Shapiro & Astin, 1998). In addition, it measures the need for achievement, order and predictability in ones life. Examples of the type of question asked are, *It is important for me to be in control of others: people and situations* and *I have a strong desire to be in control.* Unlike the negative and positive sense of control scales, this scale cannot be interpreted in a linear fashion. Scores that are found to be higher than the norm may be illustrative of someone who is unhealthily preoccupied with control, whereas individuals who attain scores that are lower than the norm may be pessimistic in terms of their ability to exercise control (Shapiro, 1994). This scale has been found to have and $\alpha = 0.76$ and a 5-week test-retest $r = 0.82$.

Modes of Control – Shapiro (1994) describes these as "the method by which the subject attempts to attain and maintain a sense of control" (p. 21). The present scale attempts to measure 4 methods of gaining control. The participant is provided with a list of words and phrases that illustrate the mode of control under question. They are then asked to circle, on a four-point response scale, the extent to which the preceding word applies to them. The following four statements are offered for response: *Describes me not well at all, describes me moderately well, describes me very well, describes me extremely well.*

A word that describes an individual extremely well gets a score of 4. A score of 1 is given to a word that does not describe the individual well at all.

(e) ***Positive Assertive Mode of Control (scale 5).*** Sixteen words and statements make up this construct. It is said to make use of an active and assertive means of gaining control, changing one's present situation (for the better) or changing one-self. It is generally viewed as a positive and healthy mode. Words and phrases used to measure the positive assertive mode are for example, *confident, responsible, communicating needs* and *self-starting.* The alpha coefficient for this scale is 0.88 and the 5-week test retest $r = 0.80$.

(f) ***Positive Yielding Mode of Control (scale 6)*** This scale is made of 14 words and phrases. It illustrates an accepting form of control. The individual scoring highly on this scale is able to actively 'let go' of control when appropriate, and is trusting of suitable others to take charge should this lead to a healthier and more efficacious outcome. Words and phrases that illustrate this scale are for example, *sensitive, listening, accepting* and receptive. The alpha internal consistency is $\alpha = 0.77$ and the 5-week test-retest $r = 0.67$.

(g) ***Negative Assertive Mode of Control (scale 7).*** This scale contains 14 items. A negative assertive style of gaining control illustrates an individual who is overcontrolling. Such a person often tries too hard to gain control over situations and people. The descriptors used to exemplify this mode of control are *rigid, critical, dogmatic* and *selfish.* The alpha consistency for this scale is 0.82 and the 5-week test-retest $r = 0.78$.

(h) ***Negative Yielding Mode of Control (scale 8)*** This scale is measured using 5 items. It describes someone who is exerting too little control. Typically, the individual

perceives that they are helpless and passive onlookers in their life, unable to change the way that they are or the situation in which they find themselves. Descriptors used to measure this mode are for example, *timid, past-oriented,* and *manipulated.* Internal consistency of this scale is 0.70 and 5-week test-retest reliability is 0.84.

Studies that have used the SCI on individuals with eating disorders have typically found that they demonstrate a lower overall sense of control are lower in a positive sense of control and are higher in negative sense of control. The methods used to gain control are characteristically the negative yielding and negative assertive modes of control (Surgenor et al., 2003; Shapiro et al., 1993). In addition, Surgenor et al. (2003) found that these modes differentiated those who use particular purgative practices and that the use of the negative assertive mode of control escalated with increasing chronicity of AN. The latter finding led them to surmise that the use of a negative assertive mode of control could be indicative of vulnerability for the development of AN. Given this information it was thought that the use of this scale would provide an interesting and informative insight into the issues of control relating to non-clinically eating disordered women. This is an area not specifically examined previously in the literature.

5. Emotional States.

The Depression Anxiety Stress Scales – 21 (DASS-21; Lovibond & Lovibond, 1995).

This is a 21-item version of the full 42-item DASS that incorporates measures of depression, anxiety and stress. The scale is defined as a state, rather than a trait measure as it asks the respondent to indicate the degree to which they have experienced a series of symptoms over the previous 7 days. The authors describe it as a dimensional rather than a categorical measure. In order to support this claim Lovibond and Lovibond

(1995) state that research data have shown the difference between clinical and non-clinical populations to be one of degree of severity.

Lovibond and Lovibond (1995) have demonstrated that the full scales show adequate convergent and discriminant validity, and Cronbach's alphas of 0.91, 0.84 and 0.90 were found for the depression, anxiety and stress scales respectively, indicating acceptable levels of internal consistency. A recent study carried out in the United Kingdom using a large sample (N = 1771) of the general population found the validity of the 42-item scale to be good and internal consistency of each of the three scales to be high (0.95, 0.90 and 0.97 for depression, anxiety and stress respectively; Crawford & Henry, 2003).

The DASS-21 is made up of 7 items from each of the three scales. A study carried out by Antony et al. (1998) found this shortened version of the DASS to display good convergent validity and high internal consistency (0.94, 0.87 and 0.91 for depression, anxiety and stress respectively). They concluded that it held advantages over the full item scale as it used fewer items (and therefore took less time to complete), had a clearer factor structure and demonstrated smaller inter-factor correlations (Antony et.al., 1998). Henry and Crawford (2005) carried out a study to test the construct validity of the DASS-21 and to provide normative data for a large UK, non-clinical population (N = 1794). They found it to have a high overall reliability (0.93), and adequate construct validity. In agreement with Antony et al., they found this shorter version to have a clearer overall latent structure than the 42-item version.

The participant is provided with a series of belief statements and asked to indicate the extent to which each statement applied to them over the past week, using the following rating scale: *Did not apply to me at all* (obtains a 0 score), *applied to me to*

some degree, or some of the time, applied to me a considerable degree, or a good part of the time and *applied to me very much, or most of the time* (receives a score of 3). The items are summed for each scale. Multiplying each subscale score by 2 will convert DASS-21 scores to full DASS scores. High scores on each scale indicate a high level of that construct.

Depression – is measured by 7 items. It is purported to measure such variables as hopelessness, inertia, self-deprecation and anhedonia. Examples of the statements used in this scale are: *I couldn't seem to experience any positive feeling at all* and *I was unable to become enthusiastic about anything.*

Anxiety - is measured by 7 items. It describes manifestations of autonomic arousal, situational anxiety and skeletal muscle effects, for example, *I felt I was close to panic* and *I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat).*

Stress - is measured by 7 items. This scale assesses nervous arousal, irritability and inability to relax, for example, *I found it difficult to relax* and *I tended to over-react to situations.*

*6. **Hunger Scale*** (Grand, 1968)

Details relating to this scale are identical to those already outlined in section 3.2.2.1.

*7. **Demographic Information***

This section of the questionnaire asked each participant questions relating to their personal circumstances, for example, their date of birth, marital status, and occupation. A measure of ethnic origin was collected owing to the fact that it has been shown to play

an important role in both the way that weight and shape are assessed and the importance given to weight and shape as a measure of one's self-esteem (evidence for this is outlined in section 1.4.4). In this case participants were asked to state what they believed their ethnic origin to be.

4.2.2.2 Visual probe task

The Stimuli

A series of 40 images depicting an equal number of females of both 'fat' and 'thin' physique posing in swimwear, were prepared as described in chapter 3. A set of 40 control images was also prepared. It is usual in this type of study to use stimuli that all belong to a single category such as stationery or household objects, as semantic (un)relatedness has been found to act as a confounding variable (Green, Cor & de Silva, 1999). Therefore, in the present study 40 pictures of household objects were used as control pictures (see appendix 7). This category featured such objects as a desk fan, telephone, cushion, armchair and table lamp. All of the images were downloaded from on-line household catalogues.

Thirty-two pictures of body images and household objects not used in the experimental trials were used as practice pictures. All image manipulations were carried out using Adobe Photoshop Elements 2.0 (Adobe Systems Incorporated 1999–2002).

Apparatus

Information pertaining to the apparatus is identical to that outlined in section 3.2.2.2.

Design

The present experiment utilised three separate conditions as follows:

Mixed condition – Here, an image depicting a woman of 'thin' physique was paired with a woman of 'fat' physique. The 'fat' physique in each pair was labelled as the 'Target' picture. Owing to the difficulty in matching 'real' women in pairs it was decided that a random number allocation procedure would be utilised to pair the pictures. Eight different random pairings were made. Over the 8 random pairings none of the thin pictures appeared with a corresponding fat picture more than once. Each of the pairings was randomly allocated to a separate E–studio file.

Body-Neutral conditions (Fat and Thin Conditions) – In both of these conditions, each of the 40 body pictures was paired with one of the 40 neutral pictures in order to determine whether or not women with eating or weight and shape concerns preferentially attended to body related information as compared to neutral information. As well as looking at an overall effect of body size, the condition was broken down in to two separate levels; Fat-Neutral pairings (**'Fat' condition**) and Thin-Neutral pairings (**'Thin' condition**), in order to ascertain whether high or low restrained or emotional eaters would preferentially orient towards or away from fat or thin images in preference to neutral images. Again, owing to the difficulty involved in matching a human figure with a non-human object, the same random allocation procedure used in the body condition was utilised in this condition. Again, each of the 8 possible pairings was randomly allocated to a separate E-studio file.

Neutral Condition – Here, household objects were paired with one another in order to see if reaction times would differ between body related and neutral stimuli (i.e. effectively this pairing acted as a baseline condition) and to act as filler material so that a

body related image did not appear on each and every trial (Mogg et al., 2000). Pairings were again based on the random number allocation procedure as described in the previous two conditions.

Practice Trials – Thirty-two body and neutral pictures not used in the main experimental trials were used as practice pictures. Pairings of fat/thin, body/neutral and neutral/neutral were made to reflect each of the 3 conditions in the main experiment.

Timings of Stimuli and Probe Presentations

A central fixation point (bold, black plus sign '+', Font: Georgia, point size 18) appeared on the screen for 500 ms prior to presentation of the picture pairs. This was to ensure that the participants were not already attending to one side of the screen in preference to the other. On offset of the fixation point, the pairs of pictures were presented side by side on the screen with a distance of 4.5cm between each of the pictures. The pictures remained on the screen for 500 ms. Immediately following the offset of the picture pairs, an arrow probe appeared in the position previously occupied by one of the two preceding pictures. The probe was either a right or left facing arrow (→ or ←, Courier New, bold, black, point size 18). The probe remained on the screen until the participant had made the appropriate keyboard response (→ or ← key on keypad). This method of response is termed a forced choice discrimination task. This type of response task encourages the participant to allocate their attention to the right and left hand side of the VDU display. Many previous studies have used a simple target location task. Here, the probe is typically a single dot and the participant responds just to the presence of the dot on the screen. The problem with this type of response is that it is always possible that the participant continues to focus on one side of the screen only and then makes a 'presence-absence response' (Fox, Russo, & Dutton, 2002). That is, they

may chose to look only at the left hand side of the display and then if the dot probe did not appear on this side they would deduce that it had appeared on the right hand side. This is problematic as it would render the task a less sensitive measure of biased attentional processing (Bradley, Mogg, Falla, & Hamilton, 1998). A schematic representation of the sequence of events is presented in figure 4.1.

Randomisation and Control of Stimuli and Probe Presentation

For each of the 'fat'/'thin', body/neutral and neutral/neutral pairings, each picture in the pair could appear on either the right or left hand side of the screen with equal probability. In addition, each picture in the pair was presented with the probe on each side of the screen with equal probability. Finally, for each of the picture pair the arrow probe could be pointing to either the left or the right of the screen with equal probability. This amounted to a total of 8 possible probe position/probe orientation/body presentations. This is summarised in table 4.1

Table 4.1 – All Possible Target Probe Positions for the Visual Probe Detection Task

TARGET POSITION	IMAGE 1	IMAGE 2	PROBE 1	PROBE 2
LPLT	Fat 1	Thin 1	←	
LPLT	Fat 1	Thin 1	→	
RPLT	Fat 1	Thin 1		←
RPLT	Fat 1	Thin 1		→
LPRT	Thin 1	Fat 1	←	
LPRT	Thin 1	Fat 1	→	
RPRT	Thin 1	Fat 1		←
RPRT	Thin 1	Fat 1		→

Key to target positions:

Left Probe Left Target - LPLT
Left Probe Right Target - LPRT
Right Probe Right Target - RPRT
Right Probe Left Target - RPLT

Using this method of presentation, the total number of trials summed to 160 in both the body and neutral conditions (20 pairings x 8 possible positions) and 320 in the mixed condition (40 pairings x 8 positions). This gave a total of 640 trials altogether. The trials were randomised across all four conditions by e-prime. A different random order was presented to each participant. The trials were divided into four, 160 trial blocks. This occurred through a process of random allocation, that is, e-prime was programmed to stop after each set of 160 trials had passed. Therefore, there was an equal likelihood that each of the picture pairs could appear in any of the four blocks. This allowed the participants to take a short, self-timed break between blocks.

SCREEN 1

500 ms

+

SCREEN 2

500 ms

SCREEN 3

Until Response

Figure 4.1 – Schematic representation of the sequence of screens in the visual probe task

Procedure

All participants were provided with an information sheet detailing the procedures involved in the study. An example of this information sheet can be seen in appendix 8. They were instructed to ask the experimenter if they had any further questions about the procedures they were about to carry out, or if they did not understand what was being asked of them. If the participants were happy that they understood what was being asked of them and wished to proceed with the study, they were given a consent form to read (see appendix 9). They were instructed to read the consent form carefully before signing and to ask if there was any aspect of the consent that they did not understand or were unsure about. Once the participant had given informed consent, they were led to a private booth and sat at a distance of approximately 75 cm in front of the monitor. A brief verbal explanation of the study was then given, that is, they were informed that they would first be presented with a cross in the centre of the screen for 500 ms, which would disappear to be replaced by two pictures placed side by side again for only 500 ms. Immediately following the pictures an arrow pointing to either to the left or to the right would appear in the position of one of the two images they had just seen. They were instructed to respond by pressing the right arrow key if the onscreen arrow was pointing to the right, and the left arrow key if it was pointing to the left. It was made clear that the experiment would be broken down into 4 blocks and that there would be an opportunity for them to rest their eyes between blocks.

They were then informed that they would first be undertaking a practice session and that all of the instructions for the study would appear on the starting screen. As the instructions would ask them to use the arrow keys to respond to the probe, these were pointed out to the participants before the experiment commenced. Again, they were told

to ask the experimenter if they did not understand any aspect of the instructions given. Once the practice session had ended the participants were asked if they had any questions. If they were satisfied that they understood what was required of them, they were instructed to press any key to begin the main experiment. The instructions were re-iterated on the starting screen of the main experiment.

Once participants had finished the visual probe task, they were given the questionnaire booklet to complete. They were informed that if they wished not to answer certain questions that this was fine, and to ask the experimenter if there were any questions that they did not understand. Once the questionnaire booklet had been completed, the participant was taken to a private room in order that her weight and height could be measured. Following this, the participant was given the debriefing sheet informing them of the full nature of the study and hypotheses (see appendix 10). They were given the opportunity to ask any questions about the nature of the study or any issues that had been raised by taking part in the study. Finally, they were given a sheet detailing useful contacts should they feel that they needed to speak to any one regarding any eating or emotion related problems that they may have (see appendix 5). The participant was thanked for taking part and informed that their experimental hours would be credited to them later that day.

4.2.3 Data analysis

(a) ***Questionnaire data***

A total number of 35 women participated in the present study. However, one participant failed to complete the DEBQ. As no assessment of restraint or emotional eating status could be made, she was not included in the study. In order to ascertain the relationship between restraint and the measured variables, they were classified as either high or low

restrained eaters based on a median split of their total scores on the restraint section of the DEBQ (van Strein et al., 1986). Accordingly, those participants who had a total score of less than 2.75 were classified as 'low-restrained' eaters and those with a total score of 2.75 and above as 'high-restrained' eaters. Table 4.2 shows the difference in means and standard deviations attained by each of these subsequent groups.

Table 4.2 – Mean (Standard Deviation) DEBQ-R Scores For High- And Low-Restrained Eaters

	Number	Mean
High-Restrained	17	3.50 (0.66)
Low-Restrained	17	1.84 (0.58)

In order to assess the relationship between emotional eating and the measured variables, participants were again classified as either high or low emotional eaters based on a median split of their total scores on the emotional eating subscale of the DEBQ (van Strien et al., 1986). Therefore, those participants who had a total score of less than 2.75 or less were classified as 'low-emotional eaters' and those with a total score of 2.75 and above as 'high-emotional' eaters. Table 8 shows the difference in means and standard deviations attained by each of the emotional eating groups.

Table 4.3 – Mean (Standard Deviation) DEBQ-E Scores for High- and Low-Emotional Eaters

	Number	Mean
High-Emotional eaters	17	3.46 (0.54)
Low-Emotional eaters	17	2.12 (0.41)

Where a participant had either by choice or in error missed answering only 1 item of any particular sub scale of the questionnaire measures, the mean for that sub scale was taken by summing the answered items within that sub scale. Where they had missed answering more than one item of any subscale, no score for that sub scale was recorded. A series of univariate ANOVAs or Mann-Whitney U analyses were carried out in order to ascertain

any differences that may be present between high- and low-restrained participants on any of the measured variables in the study.

(b) ***Reaction Time Data***

Only data resulting from correct responses to probe placement were used in the final analyses. All incorrect responses were excluded, resulting in a loss of 5.92% of the total data set. The reaction time data were divided into the four-probe/target position categories for each of the two conditions – body and mixed. The four categories were as follows:

i. Left probe – Right target (LPRT)

ii. Left probe – Left target (LPLT)

iii. Right Probe – Left Target (RPLT)

iv. Right Probe – Right Target (RPRT)

The data were then assessed to ensure that they met the assumptions for parametric analysis, and were also analysed in order to ascertain whether or not reaction times differed as a product of probe-target position.

Reaction time data was analysed using mixed factor ANOVAs. In the mixed (fat-thin) condition the within groups factors were as follows;

Probe position – right vs. left

Target position – right vs. left

In the body-neutral conditions, **body type** (fat vs. thin) was added as an additional within group factor. The between groups factor was either restraint or emotional eating status (high vs. low).

(c) *All data*

Data Transformation.

The data were subjected to frequency analysis in order to assess the skewness, normality and homoscedasticity of the residuals and to check for the presence of extreme outliers. This analysis indicated that some of the data required transformation in order to ameliorate these factors. Accordingly, logarithmic (base 10 and base 10 + 1) transformations were carried out on positively skewed data and arcsine transformations on negatively skewed data. The data were then re-analysed, and in most cases were found to be normally or near normally distributed. Where this was not the case, and therefore the assumptions required by parametric analyses were not met, non-parametric analyses were used to assess the data.

4.3 RESULTS

4.3.1 Restraint status

4.3.1.1 *Group characteristics – questionnaire variables*

Means and standard deviations were obtained for each of the measured variables. These results are displayed in Table 4.4

Diet History over the past 12 months:

Exploratory analyses of the 12-month diet history data revealed that there were less than 5 counts in many of the diet frequency categories. In an attempt to overcome this problem it was decided that the six categories should be collapsed in to just two:

(a) Those who had not been on a diet during the last 12 months

(b) Those who had been on 1 or more diets during the last 12 months. This category also incorporated those who reported that they were always on a diet and therefore, could not

specify any particular number. Dividing the participants in such away resulted in equal numbers in each category.

Table 4.4 - Means (Standard Deviations) Of Descriptive Measures for High- and Low-Restrained Eaters

Measure	High-restrained (N = 17)	Low-restrained (N = 17)	F Value	P value
Age (years)	20.8 (4.0)	20.9 (2.8)	< 1	> .1
Last ate (min)	139 (97)	134 (106)	< 1	> .1
Hungry now	2.1 (1.8)	3.1 (1.9)	2.75	> 0.1
Next meal (min)	225 (83)	150 (96)	4.93	0.034
Food now	2.7 (1.3)	3.4 (1.1)	2.96	0.095
Fullness	3.8 (1.9)	3.1 (1.6)	1.33	> .1
DEBQ-E	2.9 (0.8)	2.7 (0.9)	< 1	> .1
DEBQ-X	3.4 (0.4)	3.6 (0.7)	1.20	> .1
RS – total score	16.8 (5.6)	10.4 (5.5)	11.50	0.002
RS – CD	11.0 (4.3)	5.9 (3.2)	15.22	0.0001
RS - WF	5.8 (3.1)	4.5 (4.2)	1.21	> .1
EDI-DT (log10)	9.4 (7.0)	2.1 (4.1)	13.72	0.001
EDI-BD (log10)	12.0 (6.1)	7.7 (7.3)	3.56	0.068
Overall sense of control	5.2 (0.7)	5.0 (0.6)	< 1	> .1
Negative control	3.0 (0.9)	3.2 (0.6)	< 1	> .1
Positive control	5.1 (0.9)	5.1 (0.6)	< 1	> .1
Desire for control	4.7 (0.8)	4.9 (0.7)	< 1	> .1
Positive Assertive Mode	2.7 (0.4)	2.6 (0.5)	< 1	> .1
Positive Yielding Mode	2.6 (0.4)	2.5 (0.4)	< 1	> .1
Negative Assertive Mode	1.9 (0.4)	2.0 (0.4)	< 1	> .1
Negative Yielding Mode	1.9 (0.3)	2.0 (0.5)	< 1	> .1
BMI	22.2 (2.7)	21.8 (2.4)	< 1	> .1
Ideal weight (Kg)	53.6 (5.7)	56.0 (5.9)	1.03	> .1
Degree of Subjective overweight (%)	5.5 (3.6)	0.7 (2.4)	13.88	0.001
DASS-Depression	5.8 (8.8)	5.4 (4.9)	< 1	> .1
DASS-Anxiety	5.5 (6.5)	4.4 (3.8)	< 1	> .1
DASS-Stress	10.8 (10.2)	7.4 (7.0)	1.19	> .1
One or more diets in Past Year (No. of People Reporting)	14	3	χ^2 = 14.2	0.0001

(i) 12-Month Diet History of Low-Restrained Participants:

Fourteen of the low restrained participants reported that they had not been on a diet in the previous 12 months. Of the remaining participants in this group only 3 stated that they had been on 1 or more diets during the past year.

(ii) 12-Month Diet History of High-Restrained Participants:

Ten of the 17 participants stated that they had been on 1 or more diets during the past 12 months, 4 said that they were 'always on a diet'. Only 3 of the participants stated that they had not been on a diet within the past 12 months. These results are summarised in Figure 4.2.

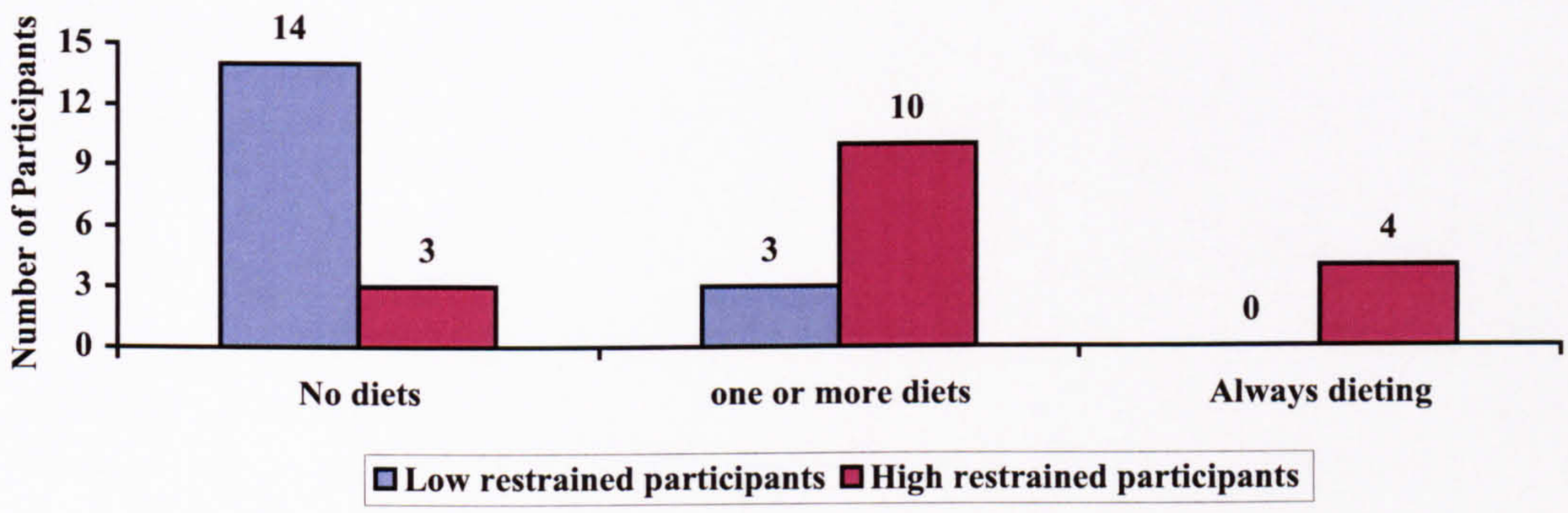

Figure 4.2 – Twelve-month diet history in low- and high-restrained participants.

The two groups did not differ significantly on measures of BMI, age or ideal weight. High-restrained eaters did report a significantly longer time until their next expected meal compared to low-restrained eaters. However, no significant differences existed between high- and low-restrained participants on any of the other measures included in the hunger scale.

Total scores on the RS scale were significantly higher in high-restrained eaters compared to low-restrained eaters. In addition, high-restrained participants obtained significantly higher scores on the concern for dieting subscale of the restraint scale, compared to low-restrained participants.

The correlation between the two measured subscales of the EDI (DT and BD) was found to be significant in this particular group of participants ($r(34) = 0.45$, $p <$

0.01). Therefore, it was decided that the two components should be analysed separately in order to investigate any differences that may be present between the two restraint groups. High-restrained participants demonstrated significantly higher scores on the DT and BD subscales compared to low-restrained participants. However, Levene's statistic showed that the variances were not equal for BD scores ($F(1,32) = 4.43$, $p < 0.05$). Therefore, a Mann-Whitney U analyses was carried out on the data, which confirmed the significant difference between the groups ($z = -2.09$, $p < 0.05$). Further evidence for body dissatisfaction in high-restrained participants comes from the Tiggemann measure of DSO, with high-restrained eaters believing themselves to be significantly more overweight than low-restrained participants. No differences in levels of perceived control or mood as measured by the DASS-21 were found.

4.3.1.2 Group characteristics - reaction time data

Median reaction times for each participant in each condition were calculated. An overall mean was then calculated based on restraint group membership for each condition. These means are shown in Table 4.5.

Table 4.5 – Mean (Standard Deviations) Overall Reaction Times for Low- and High-Restrained Eaters

	High-Restrained RT (ms) N = 17	**Low-Restrained RT (ms) N = 17**	**Difference between Conditions**
Mixed Condition (Fat-Thin)	481.4 (50.1)	487.0 (69.6)	$F = 0.13$, $p > 0.1$
General Body-Neutral Condition (Fat/Thin-Neutral)	485.5 (50.6)	484.8 (67.6)	
Fat Condition	486.5 (49.7)	482.8 (65.8)	
Thin Condition	485.0 (50.0)	485.8 (68.8)	
Neutral Condition	482.2 (47.0)	479.5 (64.9)	

A two-factor mixed sample ANOVA with bias condition (body vs. general body vs. fat-neutral vs. thin-neutral vs. neutral-neutral) as the related samples factors and restraint

status (high and low restrained) as the between groups factor was conducted on the median reaction time data in order to ascertain whether or not any differences in reaction times existed as a function of restraint status for overall reaction times in each condition. No significant differences were evident, either between the five levels of bias condition or between high- and low-restrained eaters. The bias condition x restraint group interaction was also found to be non-significant ($F < 1$).

Reaction Times as a Function of Restraint Status, Body Type and Probe-Target Positions

(i) Mixed Condition (Fat-Thin Body Image Pairings)

Reaction times for each target and probe position as a function of restraint status were obtained. These can be observed in Table 4.6. A series of ANOVAs were then carried out on the data.

Table 4.6 – Medium Response Latencies to Probes (ms) as a Function of Restraint and Probe and Target Positions (Fat-Thin)

			High-Restrained		Low-Restrained	
	Probe Location	**Target Location**	**Mean**	**SD**	**Mean**	**SD**
Fat-Thin (Target = Fat)	Left	Left	487.6	53.2	479.4	68.6
	Left	Right	472.5	49.2	489.8	67.0
	Right	Left	479.1	49.5	488.7	73.1
	Right	Right	488.8	54.4	490.2	77.1

An initial ANOVA indicated that there was an interaction between restraint, probe and target positions. In order to simplify this interaction, results were obtained for high and low restrained eaters separately. All of the key results are shown in Table 4.7.

Table 4.7 – A Summary of Results for The Relationship between Restraint, Probe and Target Position

Restraint Group	Analyses	F Value	P Value
High and Low Restraint	**Probe x Target x Restraint**	10.32	0.003
High-Restrained	**Probe x Target**	11.45	0.004
Low-Restrained	**Probe x Target**	1.42	> 1

Only the high-restrained eaters appeared to show differential reaction times dependent on the position of the probe and target. Looking at the reaction times for high-restrained eaters in table 4.6, the pattern appears to be one where times are faster when the target (fat) picture and the probe appeared in *incongruent* positions. This suggests that they are showing an *avoidance* of fat pictures.

(ii) Body Condition (Neutral and Fat/Thin Body Image Pairings)

Reaction times from high- and low-restrained eaters were obtained for each combination of target-probe positions for both the fat-neutral and thin-neutral conditions. These are displayed in Table 4.8. A series of ANOVAs were then conducted. All of the key significant results are shown in table 4.9. Where they are thought to act as useful comparisons, some non-significant results and trends are shown.

Table 4.8 - Medium Response Latencies to Probes (ms) as a Function of Restraint, Body Type and Probe and Target Positions (Fat/Thin-Neutral)

			High-Restrained		Low-Restrained	
Body Type	**Probe Location**	**Target Location**	**Mean**	**SD**	**Mean**	**SD**
Fat	Left	Left	480.4	54.5	481.3	67.8
	Left	Right	490.2	43.5	479.3	64.1
	Right	Left	490.1	56.6	487.9	68.3
	Right	Right	485.3	53.4	482.6	66.5
Thin	Left	Left	486.9	48.1	480.9	66.9
	Left	Right	478.1	51.3	480.0	69.6
	Right	Left	485.0	52.8	496.1	68.7
	Right	Right	490.1	55.3	486.2	74.4

A significant interaction between restraint, probe position, target position and body type was found. In order to further explore these data, analyses were carried out on high- and low-restrained eaters separately. The high-restrained eaters showed a significant interaction between probe and target position for the fat-neutral pairings and a marginally significant probe x target position interaction for the thin-neutral pairings. The pattern for the fat-neutral pairings appeared to be one where reaction times were faster when the target (fat) picture and probe appeared in congruent positions compared

to when they appeared in incongruent positions (Table 4.9; 2a). However, an opposite pattern was found for the thin-neutral pairings where RTs were faster for when the target (thin) picture and probe appeared incongruently (Table 4.9; 2b), indicating that the high-restrained group were preferentially attending towards the fat pictures.

Table 4.9 – A Summary of Results for The Relationship between Restraint, Body Type Probe and Target Position

Restraint Group	Analyses	F Value	P Value
1. High and Low Restraint	a. Probe x Target x Body x Restraint	6.04	0.02
	b. Probe (main effect)	4.68	0.04
2. High-Restraint Only	Probe x Target x Body	9.78	0.006
a. Fat Stimuli Only	Probe x Target	6.77	0.019
b. Thin Stimuli Only	Probe x Target	3.54	0.078
3. Low Restrained Only	a. Probe (main effect)	8.42	0.010
	b. Probe x Target x Body	< 1	> 1

In addition to these results, the initial analysis showed a main effect of probe position, with reaction times being generally faster when the probes appeared on the left side. However, further analyses indicated that this result appeared to be influenced by the low-restrained eaters, as no overall effect of probe was found for the high-restrained eaters. The low-restrained eaters showed no interaction between body type and probe and target position, therefore no further analyses were conducted on this group.

(iii) Is there an *Overall* effect of Image (Body versus Neutral) as a Function of Restraint?

It was thought an interesting exercise to see whether or not either of the restraint groups would show a bias towards or away from body stimuli in general. Therefore analyses were carried out on the combined data set from fat and thin neutral pairings. Median

RTs for each target and probe position as a function of restraint status are show in Table 4.10

Table 4.10 – Medium Response latencies to Probes (ms) as a Function of Restraint and Probe and Target Position (Body versus Neutral)

			High Restrained		Low Restrained	
Probe Location	**Target Location**		**Mean**	**SD**	**Mean**	**SD**
Body-Neutral (Target = Body)	Left	Left	483.4	51.5	481.5	67.0
	Left	Right	482.6	47.2	478.3	68.0
	Right	Left	487.1	52.9	493.3	67.3
	Right	Right	487.2	53.5	485.3	69.3

No significant interactions between restraint and probe and target position were found (all p values > 1). However, a main effect of probe position was again found, with RTs being significantly faster when probes appeared on the left side of the screen (481.4 vs. 488.2; $F(1,32) = 6.31$, $p = 0.013$).

4.3.1.3 *Bias scores*

These serve to clarify and simplify any interactions found when analysing the RT data and give an indication of the magnitude and direction of any apparent bias.

Bias scores were calculated for each participant using a modified version of the equation of MacLeod and Mathews (1988). This was in the following form:

[(Right probe / Left target – Right probe / Right target) + (Left probe/Right target – Left probe / Left target)] * 0.5

Negative bias scores show that the participant is looking away from the target image. Positive bias scores show that the participant is looking towards the target image.

Median reaction times were utilised to calculate the bias scores. It was thought that the use of median reaction times would lessen the effects of any outliers in the data, without removing effects that may be lying in the tail of the distribution. All of the

results for the bias scores (including those for t-tests and ANOVAs) are shown in figure 4.3.

(i) Mixed Condition (Fat and Thin Body Image Pairings)

An independent samples t-test was carried out in order to assess whether or not high- or low-restrained participants showed a significant bias towards either fat or thin body shapes. In this condition the fat image is the designated target picture. High-restrained eaters were shown to have significantly more negative bias scores than low-restrained eaters indicating that the they were looking more towards the thin body images (and away from the fat images). This result confirms the restraint x target position interaction found previously.

The bias scores were compared against a test value of zero (i.e. no attentional bias). The bias score for the high-restrained eaters were found to show a significant negative bias away from zero confirming that they were looking away from the target (fat) picture. The bias scores for low-restrained eaters were found to show no significant bias away from 0 indicating that they did not have a preference for either body type.

(ii) Body Condition – (Fat and Thin-Neutral Conditions)

A two factor mixed samples ANOVA was carried out on the bias scores of the high- and low-restrained eaters in order to ascertain the effect of restraint status on bias scores in both the thin- and fat- neutral pairings. This revealed a significant DEBQ-R x Body Type interaction ($F(1,32) = 6.04$, $p = 0.02$). Paired sample t-tests revealed that for the thin images the high-restrained eaters showed significantly more negative bias scores than low-restrained eaters. No significant differences were found between high- and low-restrained eaters for the fat images.

When the scores were contrasted against 0 the high-restrained eaters were shown to exhibit a significant bias *towards* the fat images and a trend towards a bias *away* from the thin images. The low-restrained eaters showed no significant bias either towards or away from the fat or thin images.

Is There an Overall effect of Image (Body versus Neutral) as a Function of Restraint Status?

An independent samples t-test revealed that there was no significant difference between bias scores for high- and low-restrained eaters. A comparison of scores against 0 showed that that neither groups showed a significant bias either towards or away from the overall body or neutral images.

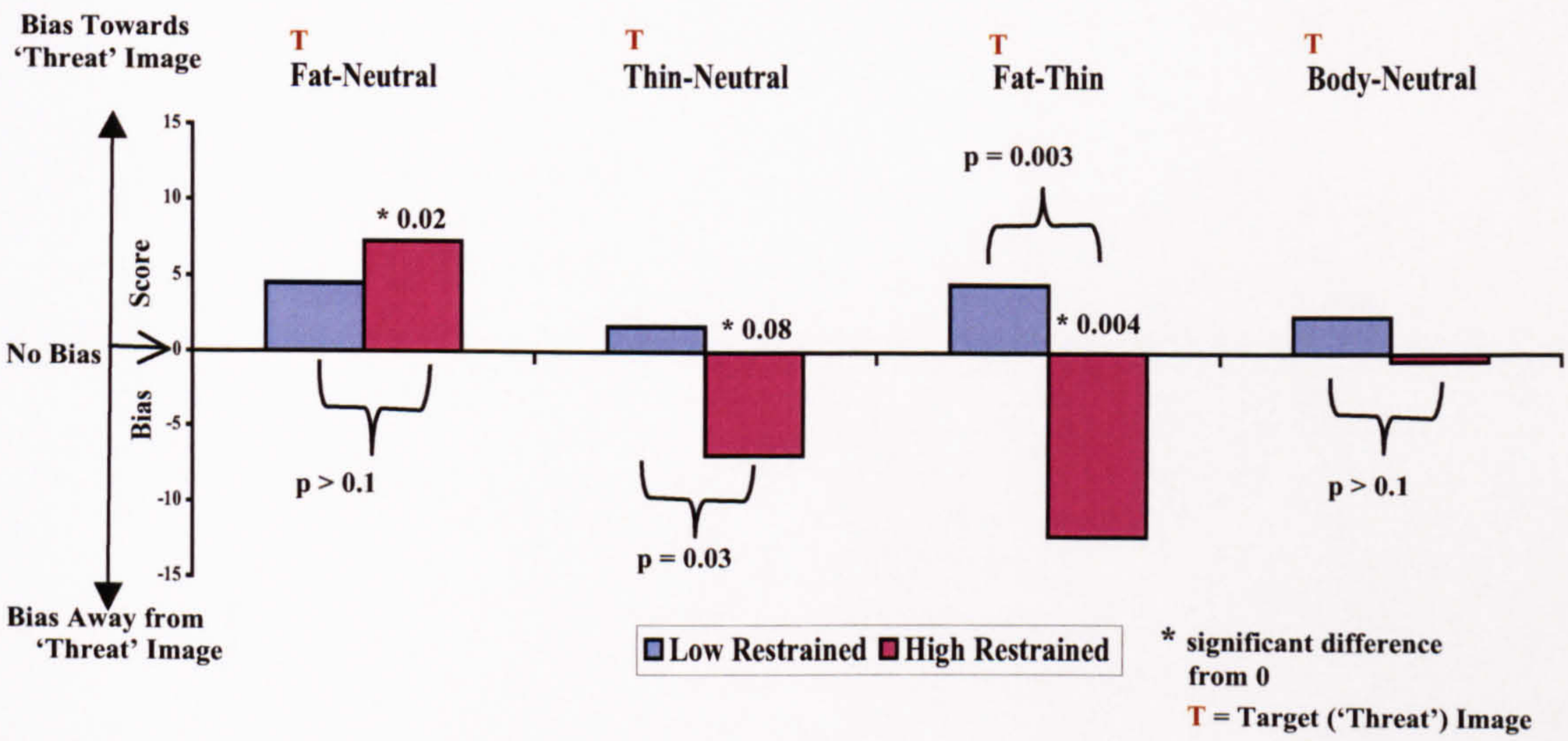

Figure 4.3 - Bias scores as a function of restraint status

4.3.1.4 *Is selective attention towards fat images in fat-neutral pairings for high restrained eaters indicative of vigilance or difficulty to disengage?*

According to Koster, Verschuere, Crombez and van Damme (2004), vigilance for fat-related information should be manifest in more rapid responding to trials where the probe and target picture appear in the same location compared with those on neutral-

neutral pairings (i.e. baseline trials). Alternatively, a difficulty to disengage from threat will give slower reaction times on incongruent trials compared with baseline trials. Therefore, paired samples t-tests were carried out in order to elucidate the nature of the fat-related bias in high-restrained eaters. This was only carried out on fat-neutral trials, as the calculation is based on the premise that any pairing will involve a threat and neutral image or word. The results are depicted in figure 4.4.

(a) ***Vigilance for Fat-Related Information?***

A paired samples t-test comparing reaction times from baseline trials with those of congruent fat image/probe locations, failed to reach significance ($t(16) = -0.19$, $p>0.05$), a result contrary to the concept of vigilance.

(b) ***Difficulty in Disengaging from Fat-Related Information?***

Reaction times from baseline trials were compared with those of incongruent fat image/probe locations. This revealed that reaction times from trials where the probe and target appeared in different locations were significantly slower than trials containing neutral-neutral pairings ($t(16) = -2.73$, $p = 0.015$). This result is indicative of a difficulty to disengage from fat-related information.

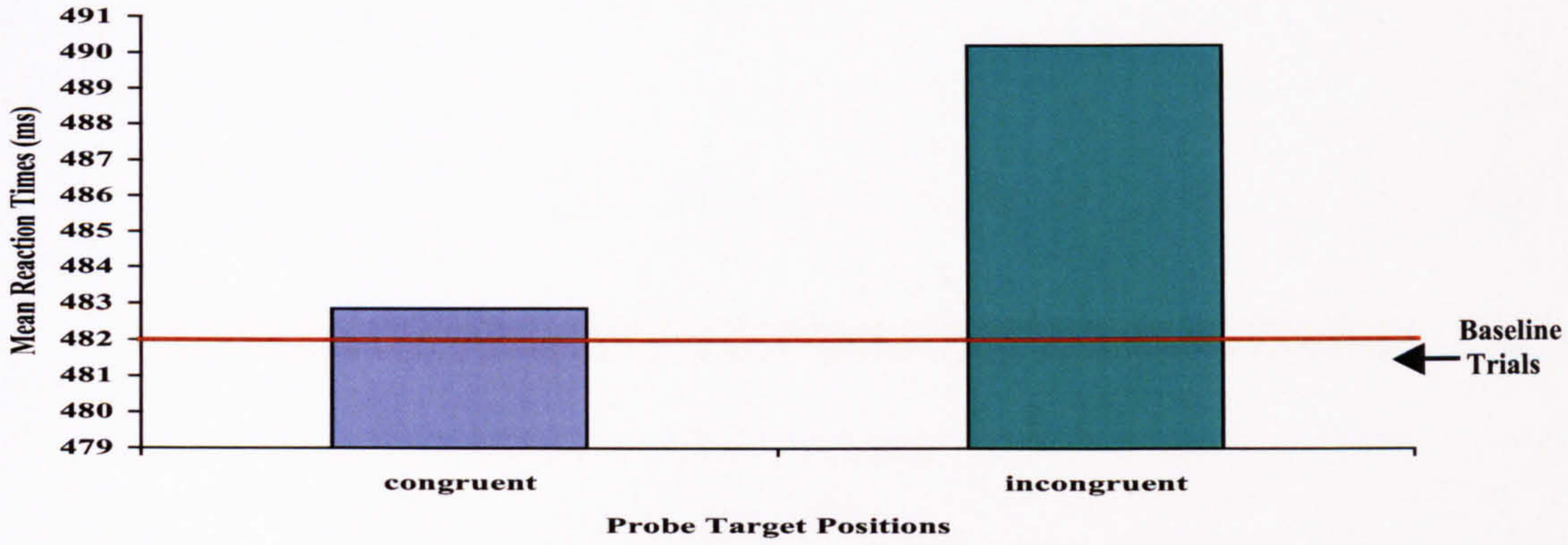

Figure 4.4 – Mean reaction times (ms) on congruent and incongruent trials for fat-neutral pairings compared to baseline trials (as evidenced by the horizontal line). High-restrained eaters only.

4.3.1.5 Item analyses

The significant results obtained for the high-restrained participants assumes that the differential responses elicited by the fat and thin images when paired with neutral images, differed as a function of image type. However, there is always the possibility that this result is biased by participants' reactions to one or two of the images in each of the groups. That is, a particular image may have elicited a particularly strong effect from the participants. The result could not then be said to have occurred as a function of image type, and we could not conclude that participants were reacting to the fatness or thinness of the images but that the results obtained merely reflect the strong effects of particular characteristics of one or two of the images. This is unlikely given that the images were independently rated and the resultant groups were based on the fact that images within each group had similar ratings of size and pleasantness. This, however, is something that has not generally been investigated in this type of research (but see Stone & Valentine, 2005). In order to verify that the results were due to overall body type characteristics, an item analyses was carried out. Reaction times were obtained for each of the *images* (rather than each participant) for each of the target probe positions for

each condition. Then a paired samples t-test was carried out comparing RTs on congruent and incongruent probe-target pairings. If one or two outliers were biasing the result we would not expect to obtain a significant effect. However, if the outcome was due to the fat group as a whole, we would expect RTs to be faster when the fat picture and the probe appeared on the *same* side. This would in effect mirror the results obtained in the previous participants analyses. Exploratory analyses showed that there were no outliers more than 2 SD away from the mean.

(i) Mixed (Fat-Thin) Condition

A paired samples t-test compared reaction times on congruent and incongruent target-probe pairings across images for the high-restrained eaters only (as no effect was found for the low-restrained group). This was found to be significant and showed that reaction times were faster when the target (fat) image and probe appeared in incongruent positions compared to when they appeared in congruent positions ($t(40) = 2.89$, $p = 0.006$). Therefore, confirming the utility of the groups as a whole. Figures 4.5 and 4.6 illustrate this effect. Because both fat and thin images are potentially of great importance for highly restrained eaters, and as it is unclear whether or not the participants are avoiding fat images or are being drawn towards thin images, figures for both types of image have been constructed. In Figure 4.6 the thin images take on the role of 'target' image and therefore congruent RTs here reflect the effect when the thin image and probe appear on the same side. Figure 4.5 (fat images) shows that the result was not altogether convincing as only 12 of the images showed the expected results of slower RTs on congruent than incongruent pairings. Looking at Figure 4.6 (thin images), thirteen images show faster RTs on congruent pairings (thin picture and probe on the same side).

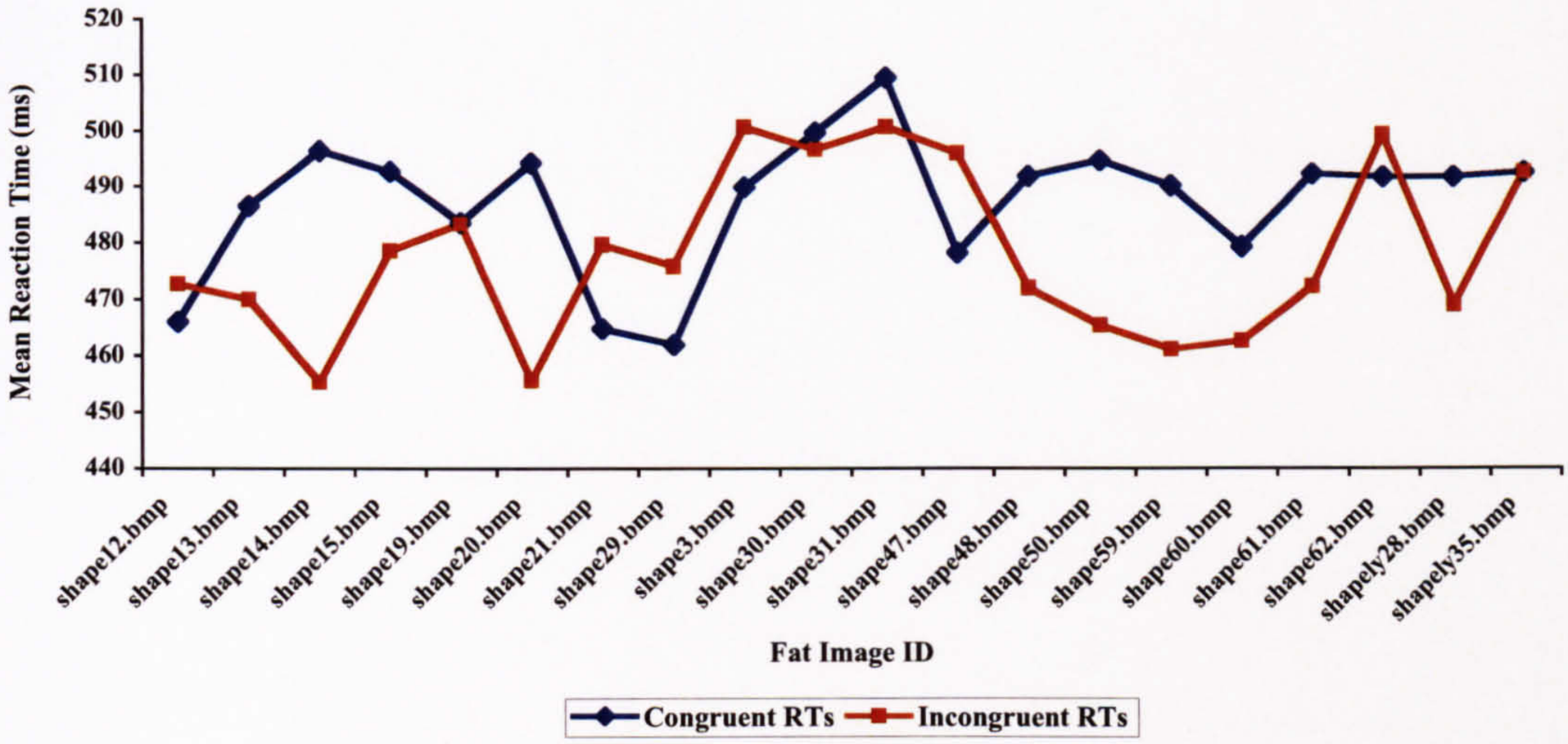

Figure 4.5 – Reaction times for congruent and incongruent probe-target pairings for the fat images (fat-thin pairings)

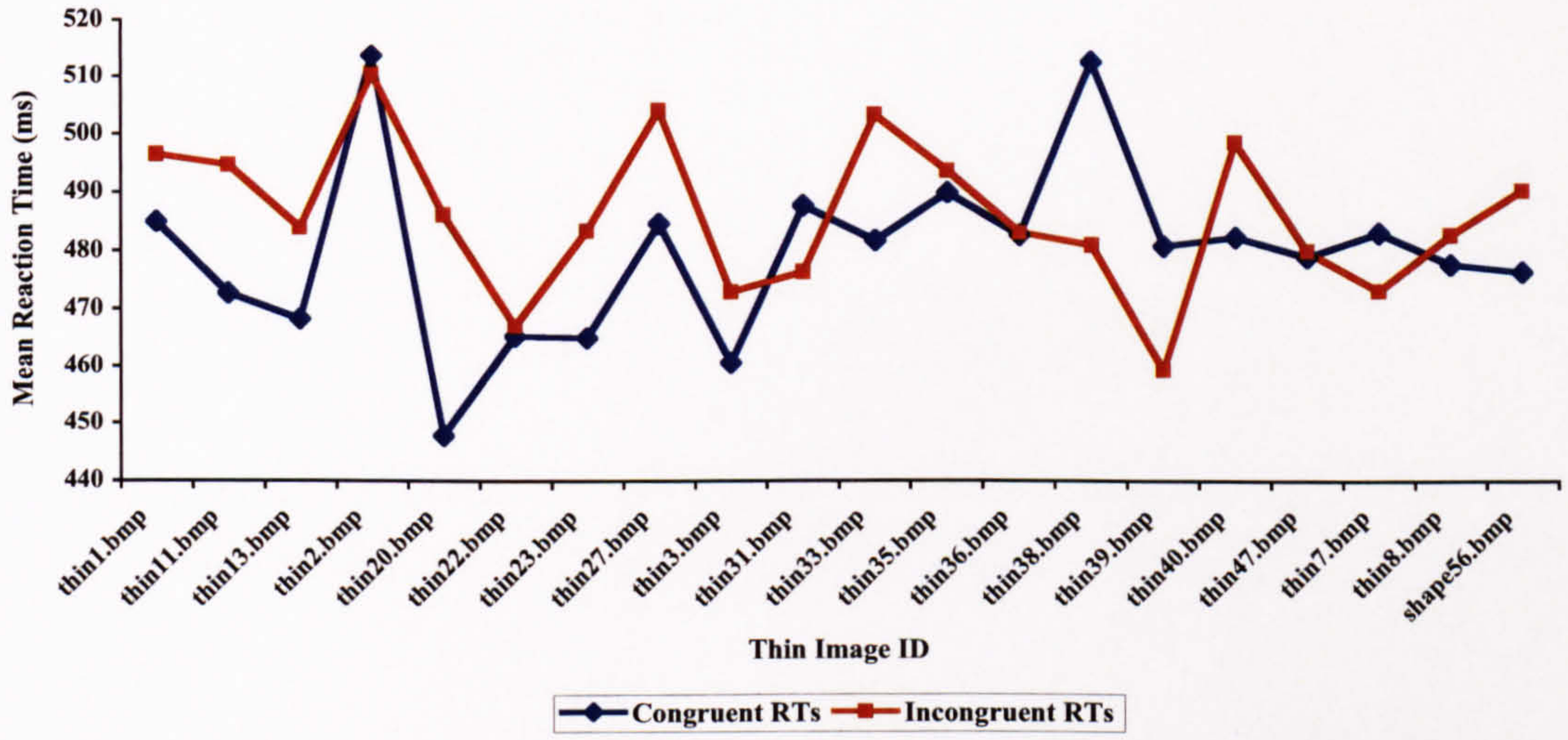

Figure 4.6 – Reaction times for congruent and incongruent probe-target pairings for the thin images (fat-thin pairings)

(ii) Body Condition – (Fat and Thin-Neutral Conditions)

The mixed ANOVA showed that there was an interaction between target-probe position and body type ($F(1,38) = 7.06$, $p = 0.011$ Greenhouse-Geisser correction). In order to

elucidate the interaction further paired samples t-tests were carried out on each of the body types separately.

Fat Images

The paired samples t-test comparing reaction times on congruent and incongruent probe target positions in the fat images demonstrated that congruent reaction times were significantly faster than incongruent reaction times ($t(20) = -2.79$, $p = 0.012$). This result is depicted in figure 4.7, which shows that for most pairs of images RTs were slower on incongruent trials. This confirms the utility of the images as a whole.

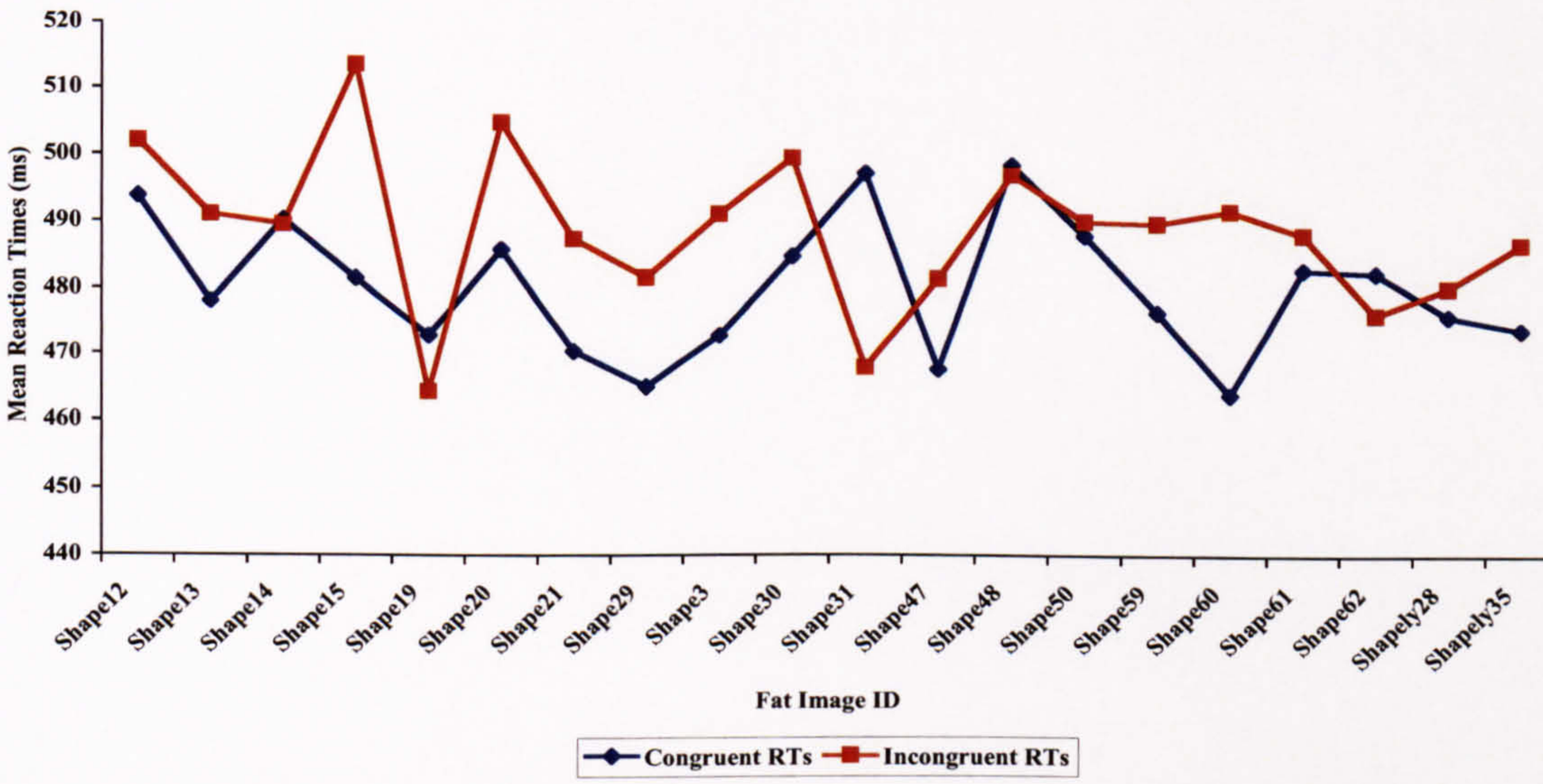

Figure 4.7 – Reaction times for congruent and incongruent probe-target pairings for the fat images (fat-neutral pairings)

Thin Images

This paired samples t-test showed that there were *no* significant differences between congruent and incongruent reaction times for the thin images ($t(20) = 1.29$, $p = 0.21$). This result implies that the trend away from thin images in thin-neutral pairings for the participants' analyses is not completely reliable and should therefore be treated with caution. This result is displayed in figure 4.8

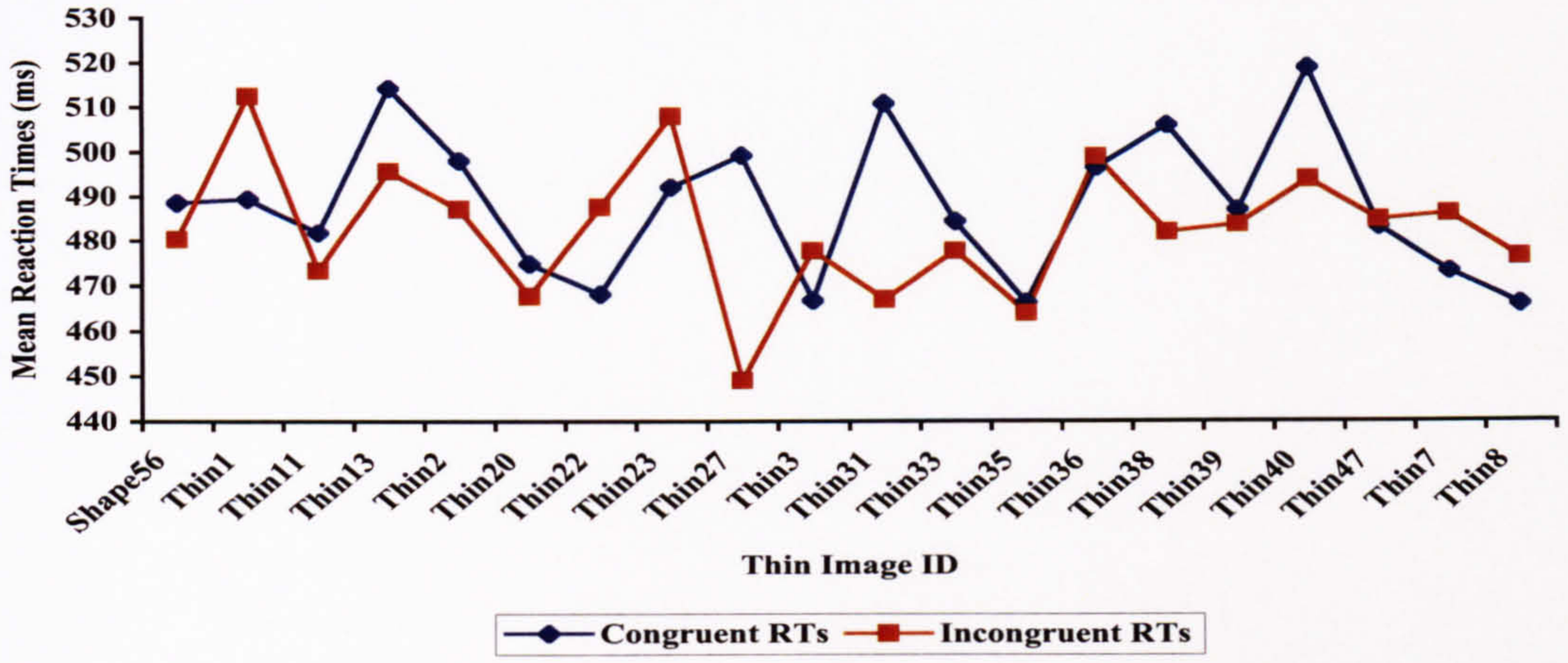

Figure 4.8 – Reaction times for congruent and incongruent probe-target pairings for the thin images (fat-neutral pairings)

The item analysis showed a similar picture of results to the original participant analysis. That is, for high-restrained participants, reaction times were significantly faster when the probe and fat image appeared in the same location compared to when they appeared in different locations. This therefore confirmed that 'fatness' in general was eliciting the bias rather than any attention-grabbing feature of one or two of the images. In contrast, the lack of difference between incongruent and congruent RTs for the thin images reflects the lack of a strong significant result in the initial RT analysis.

4.3.1.6 Error rates - do error rates differ as a function of restraint status and body type?

In order to see whether or not restraint status or body type would have an effect on the error rates a two factor mixed ANOVA with restraint status as the between groups factor and body image type (fat vs. thin vs. neutral) as the within groups factor was carried out. No main or interaction effects were found (all p values > 0.05).

4.3.2 Emotional eating status

4.3.2.1 Group characteristics - questionnaire variables

Means and standard deviations were obtained for each of the measured variables and are displayed in table 4.11

Table 4.11 Means (Standard Deviations) on Descriptive Measures for High- and Low-Emotional Eaters.

Measure	High-Emotional Eaters	Low-Emotional Eaters	F Value	P Value
Age (Log10)	20.1 (2.2)	21.6 (4.2)	1.52	> .1
Last ate (minutes)	139 (90)	135 (103)	< 1	> .1
Hungry now	2.9 (1.8)	2.4 (1.9)	< 1	> .1
Next meal (minutes)	183 (72)	201 (114)	< 1	> .1
Food Now	3.1 (1.5)	2.9 (1.0)	< 1	> .1
Fullness	3.2 (1.8)	3.4 (1.7)	< 1	> .1
DEBQ-R	2.9 (1.1)	2.4 (1.0)	1.78	> .1
DEBQ-X	3.6 (0.5)	3.4 (0.6)	1.65	> .1
RS – total score	14.1 (7.0)	13.0 (5.8)	< 1	> .1
RS – CD	9.1 (5.1)	7.8 (3.9)	< 1	> .1
RS - WF	5.0 (3.0)	5.2 (4.3)	< 1	> .1
EDI – Total	16.5 (13.00)	14.7 (10.5)	< 1	> .1
EDI-DT*	7.2 (8.2)	4.2 (4.6)	< 1	> .1
EDI-BD*	9.2 (7.0)	10.4 (7.1)	< 1	> .1
Overall sense of control	4.9 (0.6)	5.2 (0.6)	3.23	0.082
Negative control*	3.4 (0.6)	2.8 (0.8)	7.10	0.012
Positive control	5.0 (0.8)	5.3 (0.6)	1.26	> .1
Desire for control*	5.1 (0.5)	4.5 (0.9)	4.39	0.044
Positive Assertive Mode	2.6 (0.4)	2.7 (0.5)	1.04	> .1
Positive Yielding Mode	2.4 (0.4)	2.7 (0.4)	3.51	0.071
Negative Assertive Mode	2.0 (0.4)	1.9 (0.4)	< 1	> .1
Negative Yielding Mode	1.9 (0.4)	2.0 (0.4)	< 1	> .1
BMI*	21.8 (2.1)	22.1 (3.0)	< 1	> .1
Ideal weight (Kg)	54.1 (5.4)	55.2 (6.5)	< 1	> .1
Degree of Subjective Overweight (%)	2.6 (2.0)	4.7 (5.3)	1.79	> .1
DASS-Depression*	6.8 (4.4)	4.3 (4.4)	< 1	> .1
DASS-Anxiety*	6.0 (6.2)	4.3 (4.3)	< 1	> .1
DASS-Stress*	10.6 (10.0)	7.6 (7.3)	< 1	> .1
One or more diets in Past Year (No. of People Reporting)	10	7	$\chi^2 = 1.1$	> 0.1

*statistical analysis based on log10 transforms

(a) Diet History over the Past 12 Months

The data were treated in same way as that outlined in the restraint section

(i) Twelve-Month Diet History of Low-Emotional Eaters:

Ten of the low-emotional eaters reported that they had not been on a diet in the previous 12 months. Of the remaining participants in this group 6 stated that they had been on 1 or more diets during the past year, 1 participant stated that they were always dieting.

(ii) *Twelve-Month Diet History of High-Emotional Eaters:*

In this group, 7 of the participants reported not being on a diet in the past year, 7 stated that they had been on 1 or more diets and the remaining 3 said that they were 'always on a diet'. These results are illustrated in Figure 4.9

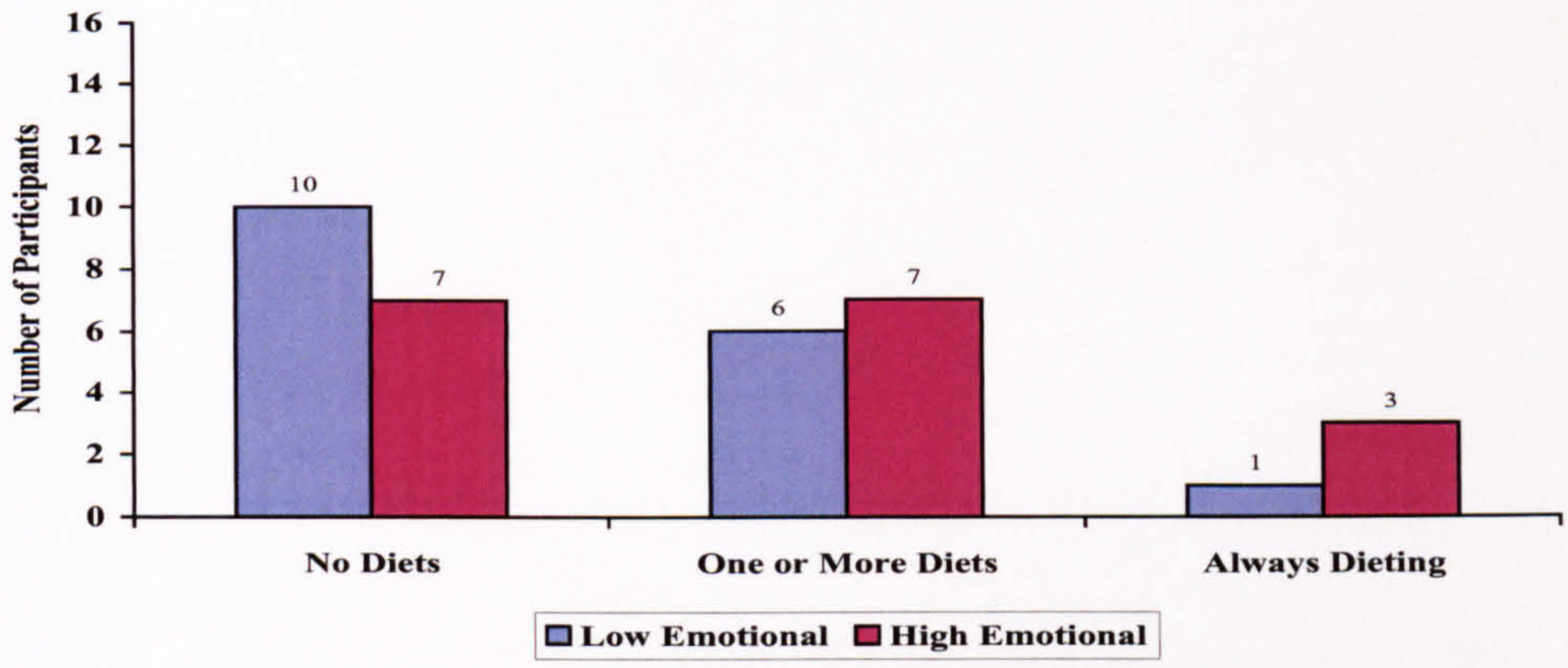

Figure 4.9 – Twelve-month diet history as a function of emotional eating status.

The only significant differences found between the emotional eating groups were those relating to the area of control. Firstly, high-emotional eaters were found to experience a significantly higher sense of negative type of control than low-emotional eaters. However, Levene's statistic indicated that there was a significant difference between the variances of the two groups on this score despite transformation ($F(1,32) = 4.94$, $p < 0.05$). Therefore, a Mann-Whitney U analysis was carried out. This supported the initial, significant result of the ANOVA ($z = -2.11$, $p < 0.05$). High-emotional eaters were also found to have a higher desire for control than low-emotional eaters. The variances were

found to be significantly different ($F(1,31) = 4.88$, $p<0.05$) so a Mann-Whitney U was carried out. This supported the significant difference between the groups ($U = 90.5$, $p < 0.05$). High-emotional eaters were found to have a marginally significant lower sense of overall control compared to low-emotional eaters. Similarly, the high-emotional eaters showed a trend towards a lower positive yielding mode of control compared to low emotional eaters. No significant differences were found between any of the other modes of control.

4.3.2.2 Group Characteristics - Reaction Time Data

Median reaction times for each participant in each condition were calculated as before. An overall mean was then calculated based on the participants' emotional eating status for each condition. A combined mean reaction time that subsumed all conditions was also computed. These means can be observed in Table 4.12.

Table 4.12 – Mean (Standard Deviations) Reaction Times for High- and Low-Emotional Eaters.

	High-Emotional RT (ms) N = 17	Low-Emotional RT (ms) N = 17	Difference between Conditions
Mixed Condition (Fat-Thin)	491.2 (59.1)	477.2 (58.4)	F = 1.97, p > 1
General Body-Neutral Condition (Fat/Thin-Neutral)	489.8 (57.7)	477.0 (58.8)	
Fat Condition	491.3 (58.8)	477.7 (58.8)	
Thin Condition	493.6 (59.7)	477.3 (59.4)	
Neutral condition	485.5 (53.4)	476.2 (59.4)	

A two-factor mixed samples ANOVA with bias condition as the within subjects factor (body vs. mixed vs. neutral vs. fat vs. thin) and emotional eating status as the between subjects factor revealed no significant differences either within the 5 bias conditions or between the two emotional eating groups ($F < 1$, $p > 1$).

Reaction Times as a Function of Emotional Eating Status and Probe-Target Positions

(i) Mixed Condition (Fat-Thin body Image Pairings)

The reaction times for each target and probe position as a function of emotional eating status were obtained. These are displayed in Table 4.13. A series of ANOVAs were then carried out on this data.

Table 4.13 – Medium Response Latencies to Probes (ms) as a Function of Emotional Eating and Probe and Target Positions (Fat-Thin)

			High-Emotional		Low-Emotional	
	Probe Location	**Target Location**	**Mean**	**SD**	**Mean**	**SD**
Fat-Thin (Target = Fat)	Left	Left	492.8	62.5	474.1	59.0
	Left	Right	485.0	61.6	477.3	57.0
	Right	Left	488.7	68.0	479.1	56.2
	Right	Right	500.6	64.2	478.4	67.2

The initial ANOVA revealed a significant interaction between emotional eating status, probe and target positions. This interaction was broken down by analysing data from high- and low-emotional eaters separately. All of the key results are displayed in table 4.14.

Table 4.14 – A Summary of Results for The Relationship between Emotional Eating, Probe and Target Positions

Emotional Eating Group	Analyses	F Value	P Value
High and Low Emotion	**Probe x Target x Emotion**	4.35	0.045
High-Emotion	**Probe x Target**	5.33	0.035
Low-Emotion	**Probe x Target**	< 1	> 1

High-emotional eaters appeared to have faster response times when the probe and target were presented incongruently compared to when presented in a congruent manner.

In contrast to the high-emotional eaters, the low-emotional eaters did not differ in their speed of response to congruent and incongruent probe-target position presentations

(ii) Body Condition - Fat and Thin - Neutral Conditions

In order to ascertain whether or not emotional eating status affected reaction times as a function of probe-target position in both fat-neutral and thin-neutral conditions, reaction times were obtained for each combination of target-probe position for both conditions. These are displayed in table 4.15. A series of ANOVAs were carried out, the results of which are displayed in Table 4.16.

Table 4.15 - Medium Response latencies to Probes (ms) as a Function of Emotional Eating Status, Body Type and Probe and Target Positions (Fat/Thin-Neutral)

			High-Emotional		Low-Emotional	
Body Type	**Probe Location**	**Target Location**	**Mean**	**SD**	**Mean**	**SD**
Fat	Left	Left	486.6	58.9	475.1	63.5
	Left	Right	492.7	51.9	476.7	56.9
	Right	Left	497.0	58.7	481.0	65.5
	Right	Right	489.0	63.3	478.9	56.6
Thin	Left	Left	493.2	56.7	474.5	58.4
	Left	Right	484.0	61.6	474.1	60.3
	Right	Left	498.8	63.5	482.3	58.2
	Right	Right	498.2	63.4	478.1	66.1

The interaction between emotional eating, body type and probe and target positions was found to show only a weak trend towards significance. As an exploratory exercise further analyses were conducted in order to investigate any patterns that may be present. However, caution should be observed when interpreting these results owing to the weak nature of the interaction. It was hoped that any significant patterns may prove interesting beginnings for future work in this area. A main effect of probe was again observed with RTs to left probes being significantly faster than those to right probes (487.9 vs. 482.1).

The interaction was initially simplified by looking separately at the results from High- and low-emotional eaters.

Table 4.16 – A Summary of Results for The Relationship between Emotional Eating, Body Type Probe and Target Position

Emotional Eating Group	Analyses	F Value	P Value
1. High and Low Emotion	a. Probe x Target x Body x Emotion	2.46	0.127
	b. Probe (main effect)	4.61	0.039
2. High-Emotion Only	a. Probe x Target x Body	4.58	0.048
	b. Probe (main effect)	4.43	0.052
a. Fat Stimuli Only		7.13	0.017
	Probe x Target	< 1	> 0.1
b. Thin Stimuli Only			
	a. Probe x Target	8.25	0.011
	b. Probe (main effect)		
3. Low-Emotion Only	b. Probe x Target x Body	< 1	>0.1

High-emotional eaters were showed a significant interaction between probe and target positions for fat but not thin images. The pattern revealed from this interaction suggested that the high-emotional eaters were preferentially attending to the fat images. The low-emotional eaters showed no significant patterns of bias.

Is there an *Overall* effect of Image (Body versus Neutral Image) as a function of Emotional Eating Status?

Reaction times for body stimuli for each of the target probe positions are shown in table 4.17. No significant interaction between emotional eating status and probe and target position was found ($F<1$, $p>0.1$). However, a significant main effect of probe was found with RTs to probes being significantly faster when appearing on the left ($F(1,32) = 6.20$, $p = 0.018$).

Table 4.17 – Medium Response latencies to Probes (ms) as a Function of Emotional Eating and Probe and Target Positions (Body versus Neutral)

			High-Emotional		Low-Emotional	
	Probe Location	**Target Location**	**Mean**	**SD**	**Mean**	**SD**
Body-Neutral (Target = Body)	Left	Left	489.9	57.8	475.0	60.7
	Left	Right	486.1	56.0	474.8	56.0
	Right	Left	499.0	59.2	481.4	60.6
	Right	Right	493.7	62.9	478.7	62.9

4.3.2.3 Bias Scores

Bias scores were calculated as explained in section 4.3.1.3. These scores along with the results from the following analyses are displayed in Figure 4.10.

(i) Mixed Condition (Fat and Thin Body Image Pairings)

An independent samples t-test revealed that there was a significant difference between bias scores between high- and low-emotional eaters. This suggests that high-emotional eaters were biased towards the thin body image images and away from the target (fat) related images. In order to ascertain whether or not the high- and low-emotional eaters were exhibiting significant biases either towards or away from the target picture, bias scores were contrasted against a score of zero.

High-emotional eaters showed a significant negative bias, meaning that they were showing *avoidance* of the fat pictures (or perhaps a preference for the thin pictures). The low-emotional eaters did not show a significant bias away from zero indicating that they were neither showing preferential attention towards or away from either of the image types.

(ii) Body Condition (Fat- and Thin-Neutral Conditions)

A two factor mixed samples ANOVA was carried out in order to ascertain the effect of emotional eating status on bias scores in both the thin- and fat- neutral pairings. No significant main effect of body type or emotional eating status or interaction effects were found (all p values > 0.05).

When the scores for high- and low-emotional eaters for each of the fat and thin-neutral conditions were contrasted against zero some interesting results were revealed. The high-emotional eaters were found to be exhibiting a significant bias *towards* fat

images in fat-neutral pairings but no significant bias either towards or away from the thin images in thin-neutral pairings. The low-emotional eaters showed no significant biases for either of the image types.

Is There an Overall effect of Image (Body versus Neutral) as a Function of Emotional Eating Status?

An independent samples t-test revealed that neither emotional eating group showed a significant bias either towards or away from the body images in general. This was confirmed when scores were contrasted against zero.

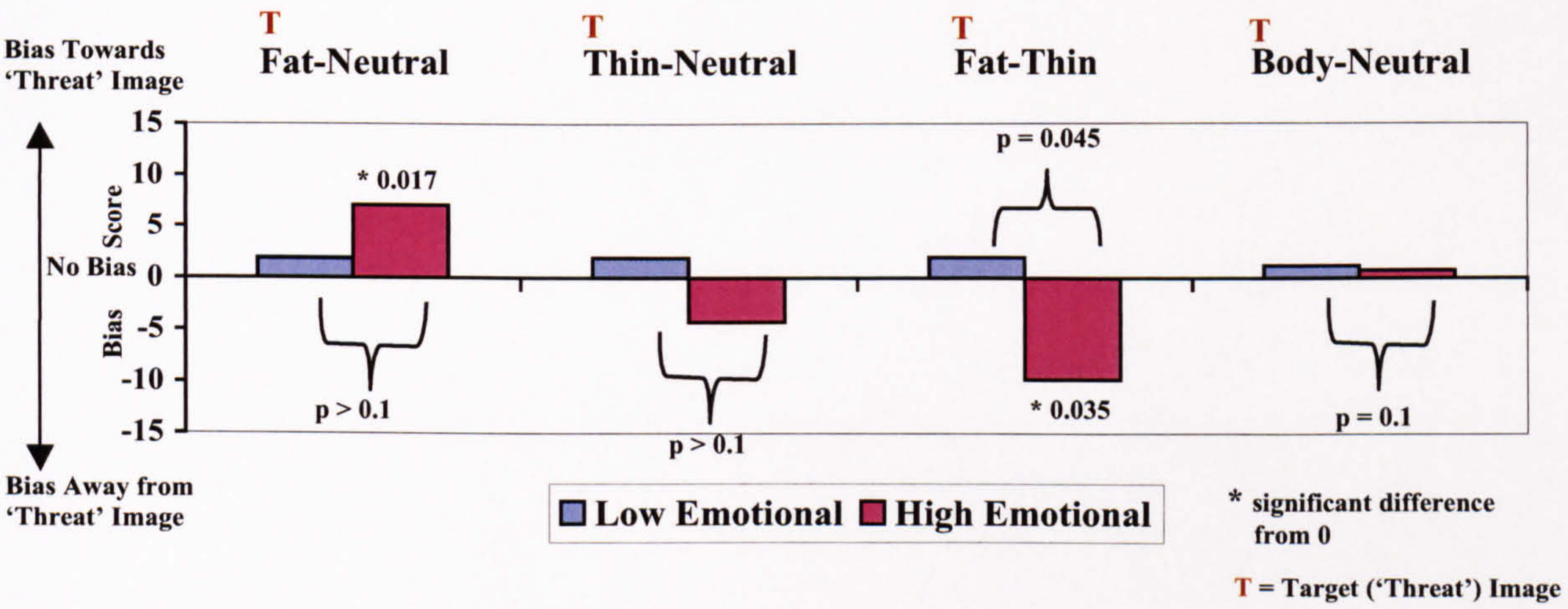

Figure 4.10 - Bias scores as a function of emotional eating status

4.3.2.4 Is Selective Attention Towards Fat Images in Fat-Neutral Pairings for High Emotional Eaters Indicative of Vigilance for Threat or Difficulty to Disengage?

As for the high-restrained eaters, reaction times for baseline trials were compared to both congruent and incongruent fat-neutral probe target positions.

(a) ***Vigilance for Fat-Related Information?***

A paired samples t-test that compared reaction times for baseline trials with congruent fat-neutral/probe locations failed to reach significance ($p>0.05$), thereby not supporting the idea of increased vigilance.

(b) ***Difficulty in Disengaging from Fat-Related Information***

Reaction times for baseline trials were compared to those of incongruent fat-neutral trials. This revealed that reaction times for the baseline trials were significantly faster than those when the probe and fat image appeared in different location, a result supportive of a difficulty to disengage from threat ($t(17) = -2.58$, $p = 0.02$). These results are depicted in figure 4.11

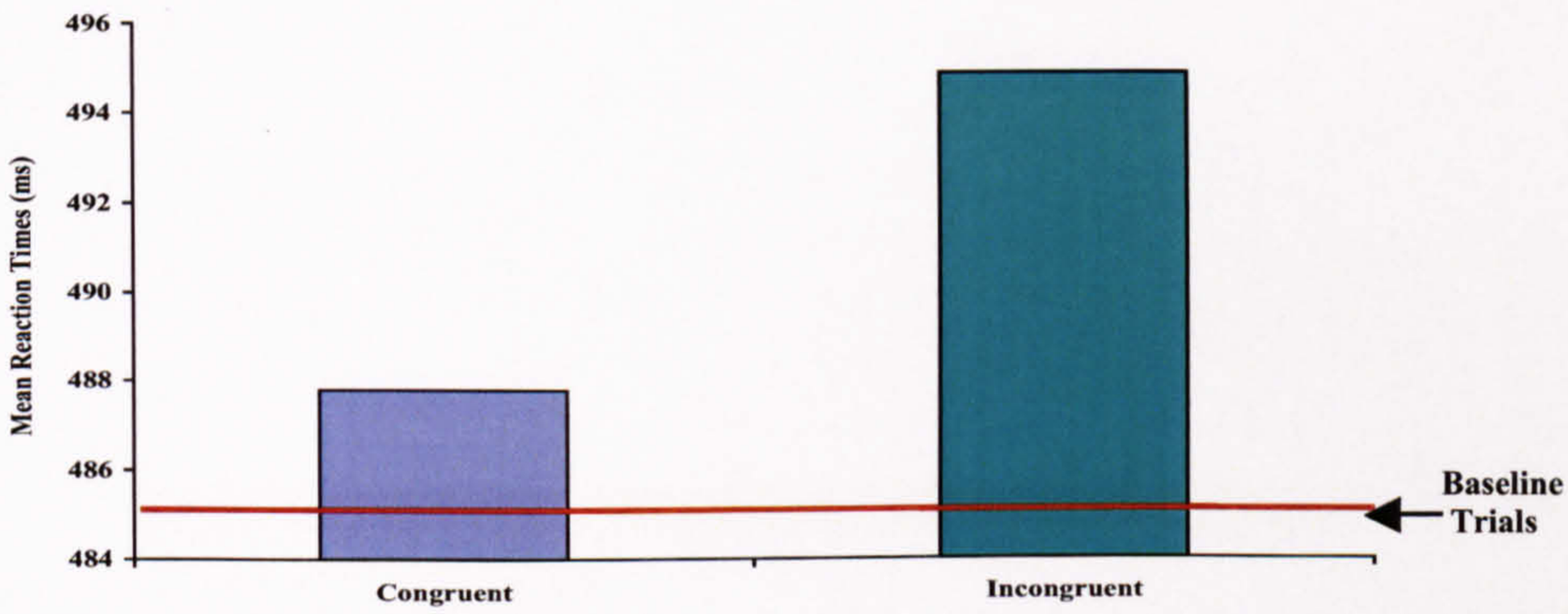

Figure 4.11 – Mean reaction times (ms) on congruent and incongruent trials for fat-neutral pairings compared to those on baseline trials (as evidenced by the horizontal line).

4.3.2.5 Item analyses

Only data for the high-emotional eaters in the fat-thin condition were subjected to item analyses as they evinced the most convincing significant results. A paired samples t-test compared reaction times on congruent and incongruent target-probe pairings. This showed that reaction times were faster on incongruent than congruent pairings ($t(40) =$

2.56, p = 0.014) that is, when the fat image and probe appeared on opposite sides. Again this supports the findings from the original participant analysis. However, the pattern of results were similar to those found for high-restrained eaters with only 12 of the fat images showing convincingly faster reaction times on incongruent pairings. Three image pairings showed equivalent times on both congruent and incongruent pairings. Similarly, for the thin images only 13 were faster when thin images and probes appeared on the same side. Owing to their similarity with Figures 4.5 and 4.6 for the restrained eaters, the figures for high-emotional eaters have not been reproduced here.

4.3.2.6 Error rates - do error rates differ as a function of emotional eating status and body type?

In order to see whether or not emotional eating status or body type had an effect on the error rates, a two factor mixed ANOVA with restraint status as the between groups factor and body image type (fat vs. thin vs. neutral) as the within groups factor was carried out. No main or interaction effects were found (all p values > 0.05).

4.4 DISCUSSION

The principal aim of the present study was to ascertain whether or not non-clinically eating disordered individuals demonstrated a bias towards threatening (fat) images in the same way as clinically eating disordered women do. The study revealed some interesting results. Matters relating to the visual probe will be examined in the first instance, followed by the important issues revealed by the self-report questionnaires.

4.4.1 Patterns of bias in non-clinically disordered eating disordered individuals

Previous studies on non-clinically eating disordered individuals using modified Stroop tasks, and to a lesser extent the visual probe task, have obtained equivocal results (see

sections 2.2.2 and 2.2.4). The present study differed from these studies however, in that it used pictorial stimuli instead of the usual word based stimuli. In addition, following on from Rieger et al. (1998) and Sackville et al. (1998), the decision was made to use both positive (thin) and negative (fat) stimuli.

Looking first at the body-neutral conditions, the results showed that the high-restrained participants were displaying a bias towards the fat (or schema-congruent) images and also a tendency to avoid the thin (or schema-incongruent) stimuli. This result appears to be in accordance with results attained by Rieger et al. (1998) for clinically eating disordered individuals. It suggests that these highly restrained women were showing the same pattern of biases as those with a clinically significant eating disorders. Placanica et al. (2002) however, did not achieve such a result with their 'non-disordered' women when using word-based stimuli. They, along with others (Bradley et al., 1998; Bradley et al., 2000; Mogg & Bradley, 1999; Yiend & Mathews, 2001; and Roelofs et al., 2005), pointed to the problematic nature of using single word stimuli particularly in non-clinically disordered individuals. They suggested using stronger, more ecologically valid stimuli. The results obtained in this study seem to lend support for the idea that non-clinically eating disordered women, in the form of highly restrained eaters, require a visual representation of the feared stimulus in order to elicit a significant bias. The result was strengthened by carrying out the item analyses, which confirmed that the obtained result was owing to the overall general nature of each of the conditions rather than being led by any novel properties of one or two rogue stimuli.

The results for high-emotional eaters, although showing similar patterns to those of the high-restrained eaters, was less convincing. Nevertheless, these results cannot be ignored, and it is clear that implicitly this group do have concerns relating to body

image. This concern seemed to be centred solely on the fat images. Unlike high-restrained eaters, the high-emotional eaters did not show increased body dissatisfaction, drive for thinness, degree of subjective overweight or level of restraint. It may be that in order to show a strong bias for body image stimuli a particular threshold of restraint in combination with body dissatisfaction is required.

The results obtained through pairing two stimuli of opposing valence produced interesting and significant results for both high-restrained and -emotional eaters. No such pairing has yet been carried out in this field of work. At first glance the fact that the more positive, thin stimuli appeared to be preferentially processed over the negative, fat stimuli would seem in discordance with the results obtained in the body-neutral conditions. However, they are similar to results found by Mackintosh and Mathews (2003) who offered up a plausible explanation for the apparently discrepant results. The thin stimuli may be considered comparable to the mildly valenced stimuli used by Mackintosh and Mathews, and the fat stimuli to the more intensely valenced stimuli. Using this comparison, it is possible that the thin pictures were avoided in thin neutral pairings (for the highly restrained group), as they may have been considered disruptive to the ongoing cognitive task performance. The fat pictures *were* processed as their valence was of sufficient strength (that is, it had reached a specific threshold) to capture attention. This did not occur in high-emotional eaters perhaps owing to the lesser role accorded to body image by this group. However, when these stimuli were placed in competition, and when participants were *forced* to make a choice between the two types of body stimuli, the fat stimuli were considered to be the more negative and therefore distracting stimuli, so an inhibitory mechanism was initiated, causing active avoidance

of the fat pictures in order to limit the amount of disruption to the ongoing cognitive task.

The comparison of reaction times on incongruent fat-neutral trials with those on baseline (neutral-neutral pairings) indicated that the high-restrained eaters and to a lesser degree, high-emotional eaters, were experiencing a difficulty disengaging from the fat images. Cognitive behavioural theories of eating disorders typically maintain that such biases are owing to an increased vigilance for threat, so the present findings appear to be in direct contrast to this view. Researchers predominantly in the field of anxiety research have produced results in concordance with those of the current study (e.g. Koster et al., 2004; Fox, Russo, & Dutton, 2002; Fox, Russo, Bowles & Dutton, 2001; Yiend & Mathews, 2001, and Compton, 2000). Therefore, disengagement issues may prove an interesting area for future investigation for those wishing to further elucidate the nature of cognitive processing biases in eating disordered individuals (clinical and non-clinical). Given this finding, issues relating to disengagement will be examined further in Chapters 6 and 7.

4.4.2 Emotional Eating and the issue of control

Finally, the self-report data produced some interesting results. Unsurprisingly, high-restrained participants demonstrated higher scores than low-restrained individuals on measures of body dissatisfaction and drive for thinness. They also believed themselves to be significantly more overweight than the low restrained participants. This apparent high level of body discontentment may have been the driving factor for both the high level of restraint and the observed attentional bias. No such differences were found between high- and low-emotional eaters. It is therefore not surprising that no firm body image related biases were found between the two emotional groups. This result

may be indicative of the fact that body satisfaction plays a less important role for many emotional eaters.

One area in which the high- and low-emotional eaters did differ was in the area of control. High-emotional eaters felt a greater sense of negative control than did low-emotional eaters. That is, they believed that they were losing or had lost control over various aspects of their lives and that others had control over them. This was coupled with a tendency towards feeling a lower overall sense of control. This is indicative of a belief that they were unable to gain and maintain a sense of control over their current situation. These feelings would have been mitigated slightly had the participants expressed that they were happy with the level of control that they had over their lives. However, the high emotional eaters also had a significantly higher desire for control. This encompasses the need for achievement, order and consistency in their lives as well as a feeling that they had power over their own fate. This need for control contrasts to some extent with their higher scores on the positive yielding mode of control, that indicates an ability to let go of control and the understanding that others can be trusted to take control should this be appropriate. This is considered a healthy mode of control and may be an attempt by these individuals to lessen the negative impact connected with a low sense of control coupled with a high desire for control. It may also go some way in explaining why they did not experience significantly higher levels of stress, anxiety and depression than the low-emotional eaters. The issue of control is certainly an interesting issue and may play an important role in the development of therapies for those eating disordered individuals with a low sense of control.

In conclusion, the present study has successfully revealed the presence of information processing biases in high-restrained eaters. Similar biases were found in

highly emotional eaters but only in a 'competition' setting where they were 'forced' to choose between two types of body stimuli. Further to this, body-neutral biases in high-restrained eaters were found not to be due increased vigilance for fat related stimuli but rather a difficulty to disengage from such material. Given that vigilance for threat-related material is a main claim of eating disorder theories, and that these theories play a major role in the development of therapies, there is good reason to look at the process of disengagement in more detail. However, before embarking on this task it is important first to explore weight and shape related processing in a group of individuals also considered to lie on the continuum of eating disorders – weight-loss dieters. As previously discussed, dieting is thought to play a major role in the development of clinical eating disorders (see sections 1.1; 1.3.7). In addition, the term dieting has often been used interchangeably with that of restraint (section 1.3.5). Therefore, the following chapter will outline a study that uses the same pictorial visual probe task to explore weight and shape related processing in a sample of dieters.

CHAPTER 5

Exploring the nature and direction of weight and shape related attentional biases in weight-loss dieters, weight-maintainers, and non-dieters by use of a pictorial visual probe detection task

5.1 BACKGROUND AND RATIONALE

The results from the previous study suggest that those high in restraint show a similar pattern of weight- and shape-related attentional biases as those with clinically diagnosed eating disorders. However, high-emotional eaters did not appear to demonstrate such a strong pattern of biases. This may imply that body-related biases are not common to all types of 'disordered' eating behaviours and may be dependent on a particular set of criteria. Certainly, the factors that differentiated high- and low-restrained eaters (apart from restraint) were body dissatisfaction, and the number of self-reported diets over the past year. Level of restraint and body dissatisfaction appeared to play no role in the differentiation of high- and low-emotional eaters. This suggests that perhaps their eating behaviour was being motivated by factors other than body concern - perhaps control- or food-related issues.

As previously discussed (section 1.3.5) restraint and dieting are often used interchangeably as a descriptor of eating behaviour. Not everyone is happy with this take on the subject (e.g. see Wardle et al., 2000). Lowe (1993) also disagrees with this view. He points out that typical measures of restraint do not take into account the actual 'real' energy deficit experienced by participants and believes that dieters identified by such measures are not actually dieting in the true sense of the word. Section 1.3.4 also highlighted the difficulty that researchers have when trying to define dieting leading to marked differences in prevalence rates for dieting.

Studies that have purported to look at processing of weight- and shape-related attentional biases in non-clinically disordered individuals have typically found equivocal results (see sections 2.2.2. and 2.2.4.). However, these studies have in general used different measures to divide participants into graduated levels of non-clinically disordered eating behaviour. For example, Boon et al. (2000) used a median split on the restraint scale (Herman et al., 1978), whereas Placanica et al. (2002) divided participants depending on their scores on two subscales of the EDI-2 (Garner, 1991). Finally, Labarge, Cash and Brown (1998) divided participants on the basis of scores on the Appearance Schema Inventory (ASI; Cash & Labarge, 1996). Only one published study to date actually divided participants as a function of dieting status. Cooper and Fairburn (1992a) looked at selective processing of eating, weight and shape related words in those with AN, BN, 'normal dieters' and 'symptomatic dieters' using an eating disorder related Stroop task. They formulated a strict definition of 'dieting' (see 3.2.2.1). 'Symptomatic dieters' were those who met this criteria but who had reported having symptoms of either AN or BN (past or present). 'Normal dieters' must not have had any history of eating disorder related symptoms. They found that those with AN, BN and 'symptomatic dieters' showed slowed processing of disorder relevant words. The 'normal dieters' however, did not differ significantly from non-dieting, normal controls. They concluded that selective processing of this type was exclusive to those with eating disorder related symptoms of either a current or historical nature. The problems with Stroop have been highlighted previously (section 2.2.3). In addition, Cooper and Fairburn (1992a) did not differentiate between eating, weight and shape related words and so, by their own admission, this may have masked any fine differences.

In conclusion, implicit weight- and shape-related processing biases in dieters have not been adequately explored using a direct measure such as the visual probe task. Therefore, the main aim of the current study was to see whether or not any such biases exist in a group of 'normal' dieters and if so, to explore more thoroughly their nature. As only one study has specifically looked at dieters in this context, predictions are difficult. However, given the commonplace use of dieting and restraint as interchangeable constructs, it would be expected that dieters would show the same pattern of biases as high-restrained eaters (but see Cooper & Fairburn, 1992a). It was therefore predicted that weight-loss dieters would show the same pattern of biases as those high in restraint (and those with eating disorders). More specifically, weight-loss dieters would be expected to show a bias towards schema-congruent (fat) related stimuli and away from schema-incongruent (thin) related images in body-neutral pairings.

When fat and thin stimuli were placed in competition it was again predicted that weight-loss dieters would show avoidance of the fat related stimuli in order to lessen the 'interference' to the ongoing cognitive task.

5.1.1 Evolution and its' Role in the Perception of Age and Attractiveness

In section 1.1 the interchangeable nature of beauty and attractiveness were discussed. In addition, Etcoff et al. (2004) pointed to the narrowing of the beauty ideal to one where only tall and thin women are considered to be attractive. Henss (2000) stated that it is a common belief that the "Criteria of human beauty is solely culturally defined" (p. 501). However, more recently evolutionary psychologists have challenged this view. They believe that the determinants of physical attractiveness can be biologically determined in the context of genetic determination (Singh, 1994). Throughout the animal kingdom attractiveness is commonly used as a measure of mate quality (in terms of fecundity and

reproductive success). For facial attractiveness, specific features have been identified as being reliable indicators of reproductive success. However, much less research has been carried out on bodily features that may provide an indicator of reproductive potential. Over the past decade however, one feature has been identified as a possible candidate for this role, the waist-to-hip ratio (WHR). In addition, it is believed to be a universal indicator of bodily attractiveness (Henss, 2000), and that the ability to detect mate quality using morphological features may also be genetically predetermined (Singh). During puberty in females, and under the control of female sex hormones, more fat is distributed around the glutofemoral region (buttocks and thighs). This is referred to as a gynoid fat distribution (Singh).

The WHR is calculated by measuring the waist at its narrowest point (between the base of the ribs and the ileac crest) and dividing it by the breadth of the hips (the widest point, taking in the greatest protrusion of the buttocks; Singh, 1994). A WHR of 0.7 indicates a waist much smaller than the hips – or an 'hourglass' figure, whereas, a ratio of 1.0 denotes waist and hip measure that are approximately equal – resulting in a more 'tubular' shape. A healthy WHR for pre-menopausal women lies between 0.67 and 0.8, in contrast to a postmenopausal norm of between 0.85 and 0.95 (which is also similar to a normal male WHR; Singh, 1994). Singh has carried out a series of studies that link WHR with hormonal status, fecundity, youthfulness and health risk (Singh, 1993,1994 and 1995). These generally conclude that a lower WHR is associated with increased attractiveness, youthfulness, fecundity and decreased chance of major diseases. Singh developed a series of line figures that simultaneously manipulated 3 levels of size (underweight, normal weight and overweight) with 4 levels of WHR (0.7, 0.8, 0.9, 1.0). He consistently found that among male and female American adults,

figures of 'normal' weight and low WHR (0.7) are deemed most attractive. However Henns (2000) and others (see Tassinary & Hansen, 1998) point out that BMI may play an equal if not more important role. Therefore, it is possible that both of these factors are taken into consideration when making assessments of attractiveness. Given this information, it was decided that it would be valuable to ask participants to rate the figures on attributes of attractiveness in order to see whether dieters and non-dieters would differ in their perception of what size and shape of body image was most attractive. Moreover, other studies that have looked at judgements of body size and shape most frequently talk of bodily physical *attractiveness* in preference to any other descriptor (see Markey et al., 2002; Tovée, Reinhardt, Emery & Cornelissen, 1998). Other studies that have investigated the effects of body size and shape on motivation to restrain food intake or diet have used a measure of attractiveness (e.g. Forestell, Humphrey & Stewart, 2004). Forestell et al. did not find any differences in ratings of attractiveness between restrainers and non-restrainers. However, in their experiment, only line drawings were used. They believed that such methods of assessment might lack ecological validity and that actual photographs of women may be suitable. Chapter 3 of this thesis outlined a pilot study where participants were asked to rate the pleasantness of a group of female bodies. Here, women with larger BMIs were rated as less pleasant than those with smaller BMIs. In order to see whether or not the same differentiation would be made using a slightly different descriptor, participants were asked to assess how *attractive* they perceived the various body sizes to be. If the societal ideal of beauty were indeed one of tall and thin, and if pleasantness and attractiveness can be used interchangeably when describing a human body, then it would be predicted

that all participants would rate the 'thin' images as significantly more attractive than the 'fat' images.

Han, Morrison and Lean (1999) asked 201 men and 161 women to rate the age of a series of silhouettes of known BMI and WHR. They found that as the BMI of the silhouette increased so did the estimation of age. Similarly, age also increased with increasing WHR, so that those of a more tubular shape were rated as older than the more curvaceous figures. In addition, between the waist measurements of 65-88cm, each cm was related to an average increase of age of one year. The age of the actual participants did not affect the way in which the silhouettes were rated. Given this information, the participants in the present study were also asked to rate the age of the body images. It was predicted that the 'fat' images would be rated as being significantly older than the 'thin' images.

In addition, Henns (2000) carried out a study that asked 180 men and 180 women to rate 6 photographs of women. Each of the women were rated 3 times, once in the original form, once with digitally manipulated higher WHR and once with a manipulated lower WHR. His results supported those of previous studies using line drawings that found smaller WHRs to be rated as significantly more attractive than large WHRs. Two-dimensional measurements of waist and hip were taken for the body image stimuli used in the study so that a '2DWHR' could be calculated and the relationship between ratings of BMI, WHR and attractiveness could be assessed. Therefore, it was decided to see whether or not the 2DWHR of the current stimuli was related to ratings of attractiveness.

5.2 METHOD

5.2.1 Participants

A total of 40 female participants were drawn from a Student (undergraduate and postgraduate) and research staff population, based at the University of Bristol. They were recruited in one of three ways as follows:

(a) Food and Drink Group Research Database

This was made up from a group of students and staff throughout the University, gathered during Freshers week 2003. Those on the list had expressed an interest in taking part in food and drink related research. An e-mail describing the study was sent to female members of the database who were aged between 18 – 45 years old, asking them if they were interested in taking part in a dieting related study (see information sheet, appendix 13). Participants were offered £8 for taking part in the study.

b. Experimental Hours Scheme

See section 4.2.1 for details of this scheme. All participants were awarded 1.5 hours experimental credit on completion of the study.

c. Poster Recruitment

Posters and flyers advertising the study were placed at various points around the University of Bristol. All participants recruited in this way were offered £8 for taking part in the study.

The mean age of the resultant group of participants was 20.8 years (SD = 3.4 years; age range 18 – 34 years).

Seventy percent of the participants described themselves as white British, 11.5 % as 'other white background' (including Irish) and 7.5 % as Chinese. The remaining 11%

of participants were made of other ethnic backgrounds. All participants had normal, or corrected to normal vision. Participation was on a voluntary basis and complete anonymity was assured by assigning each participant a code number. All participants taking part in the study provided informed consent.

5.2.2 Measures

5.2.2.1 Self-Report Questionnaire Measures

This consisted of a 15-sided booklet containing scales thought relevant to detecting body-image related biases in various groups of dieters and non-dieters. The measures used are identical to those in study section 4.2.2.1 apart from the following omissions and additions.

5.2.2.1.1 Omissions

1. Body Shape/Weight Concerns

(a) The DT subscale of the **EDI-2** (Garner, 1991).

It was decided on this occasion not to include the DT subscale of the EDI-2, as scores in both study 1 and 2 had been so heavily positively skewed.

2. Dietary Restraint

(a) The RRS (Polivy et al., 1978)

The RRS was not administered on this occasion as many participants in the previous study expressed problems in determining weight fluctuations and gains in the weight fluctuation subscale of the questionnaire. This resulted in participants either missing out these questions altogether or reporting that they had guessed the answers, calling question on the reliability of the overall scores for many participants.

Wardle (1987) reported similar problems when assessing restraint in a group of 147 'normal', non-eating disordered students. She found that one third of the women in her study were unable to complete the WF subscale and concluded that the validity of the RS as an accurate measure of restraint was therefore called into question.

3. Control

The SCI Modes of Control Subscales (Shapiro, 1994).

The modes of control subscales were not administered in the present study owing to the difficulties expressed by many participants relating to the definition of the list of words and phrases. This was particularly difficult for the non-native speakers of English who participated in the study.

5.2.2.1.2 Additions

As body dissatisfaction appeared to play a major role in differentiating high and low restrained eaters, it was decided to add some further measures of body dissatisfaction and weight and shape concern. This may help to identify specific areas of concern in those who are dieting.

1. Body Shape/Weight Concerns

(a) Perceived Current and Ideal Size and Body Size Discrepancy

These were measured using a set of figural body shape stimuli devised by Stunkard, Sørensen, and Schulsinger (1983; see appendix 11). The stimuli were originally created as a simple, self-report measure of body image. The measure consists of 9 line drawings of females gradually increasing in BMI. Three measures are derived from the scale. Typically, respondents are asked to indicate the figure perceived by them to most closely match their own current size and the figure that they would most like to look like. The

third measure, the Stunkard discrepancy score, is interpreted as a measure of body (dis)satisfaction. It involves subtracting the number of the chosen ideal figure from the number of the participant's perceived current figure. Positive scores would be an indication that the individuals preference for a smaller body size whereas, negative scores would denote a preference for a larger body size. The size of the discrepancy score gives an indication of the degree of dissatisfaction with their current body size, with larger scores representing a higher level of dissatisfaction. A score of zero signifies complete satisfaction.

A further measure of body size discrepancy is obtained by comparing the actual measured BMI of the participant with BMI norms produced by Bulik et al. (2001), for each of the 9 Stunkard figures. These norms were derived from a cohort of twins and members of their family (N = 16,728). Women were asked to score the figure most closely resembling their current size, as well as providing information as regards their actual BMI. Norms were calculated by determining the average actual BMI of the group of women choosing each one of the 9 figural silhouettes. Polyserial correlations between the log of the BMI and each of the silhouettes gave a result of 0.81. Bulik et al. reported overall summary norms for each figure collapsed across all age groups and those for each of the six age cohorts (see appendix 11 for Stunkard figures along with corresponding norms). The collapsed norms were used as a basis for comparison in the present study as the current group of participants crossed more than one of the 6 age categories used by Bulik et al.

A discrepancy figure can be derived by subtracting the BMI of the figural silhouette chosen as looking the most like their current figure from that of their actual measured BMI. A score of 0 will indicate an accurate judgement of size, a positive

score, an underestimation of the current BMI (i.e. you think you're smaller than you actually are) and a negative score an overestimation of your current BMI (i.e. you think you're larger than you actually are).

(b) Perceived Current and Ideal Size and Shape and Attractiveness

These measures were ascertained by utilising a set of 12 line drawings of women developed by Singh (1994). The figures are purported to signify a 5'5" tall female and are divided into 3 BMI categories as follows;

1. Underweight – 90lb (40.82kg)

2. Normal weight – 120lbs (54.43kg)

3. Overweight – 150lbs (68.04kg)

In order to assess validity of the weight categories, Singh (1994) asked 72 male participants to designate each of the figures in to one of the three weight categories. All but three of the participants showed agreement with the initial categorisation as selected by Singh. The measure is able to independently assess the contribution of both shape and size (BMI) to the measured variable (usually attractiveness). In order to control for positioning effects, the 12 figures were randomly arranged on a sheet of A4, with four figures to each of three rows. Two unique random arrangements were used in the experiment (after Singh, 1994). Each participant was randomly assigned either question book 1, which contained arrangement 1, or question book 2, containing arrangement 2. The figures were numbered from 1 – 12 in both arrangements. The participants were shown the set of figures 3 times, each time on a separate sheet of paper within the question book. They were asked to choose from the 12 figures the one that they felt most closely matched their own current appearance, the one they would most like to look like

and lastly the one that they felt was the most attractive. The figures can be seen in appendix 12.

(2) *Measurement of Actual Size and Shape*

Waist-to-Hip Ratio (WHR)

A WHR was calculated for each of the participants using the Singh (1994) definition. That is, by measuring the waist at its narrowest point (between the base of the ribs and the ileac crest) and dividing it by the breadth of the hips (the widest point, taking in the greatest protrusion of the buttocks).

3. Demographic Information

Ethnic Origin

Participants were asked to note their age, and ethnic origin. In Study 2 participants appeared to be unsure how to describe their ethnic origin. Therefore, in the present study a list of possible options was displayed. The options were those used by the University of Bristol Personnel Services in their recruitment package. The choice of options is derived from the UK census of 2001. Each participant was asked to tick the box that best described how they saw their ethnic origin. Owing to the sensitivity of the measure, participants were given the choice of refusing to supply the information.

5.2.2.2 Visual probe task

The stimuli, method and procedure for this task are identical to those detailed in section 4.2.2.2. The information sheet, consent and useful contacts list are revised versions of those seen in appendices 8, 9 and 10. These can be seen in appendices 13, 14 and 15 respectively. The debrief sheet is essentially unchanged from used in Chapter 4 (see appendix 8).

5.2.2.3 Body image ratings tasks

(a) Bodily Age, Size and Attractiveness

Participants were asked to rate the attractiveness and age of each of the body images. They were told to concentrate on the body of the image and to try and ignore the face. In order to reassess the utility of the size groupings of the images, the participants were also asked to rate the size of the bodies. All methodological and procedural details pertaining to this task are identical to those outlined in section 3.2.2.2 (but the descriptor attractive replaced that of pleasant). In the age ratings task, participants were asked to make a judgement of the age of the women they had just seen. Any age between 18 and 50 years could be chosen. Images were again flashed onto the screen for only 500 ms. This was followed by a screen asking the participants to chose an age that they felt most matched that of the woman they had just seen. Responses were made by keying in their chosen age using the number pad on the computer keyboard.

(b) Association of WHR and Attractiveness

WHR is considered to be important in the assessment of attractiveness (section 5.2). However, most studies in this area have been carried out using line drawings, which are considered by many to lack ecological validity (Tassinary & Hansen, 1998; Henns, 2000 and Forestell et al, 2004). As in the Henns study, measurements of '2Dwaist' and '2Dhip' were taken from each of the stimuli. Although, these measurements are based on 2-dimensional representations, and are therefore only approximations, it was believed that the exercise would serve as an interesting insight into the relationship between WHR and attractiveness. The measurements in the present study were taken using Aquaruler, a multifunctional screen measuring tool (Version 4.2.4, dotsw ©2001-2003,

http://www.dotsw.com). In order to make measurements as accurate as possible, they were assessed in terms of pixels. The pixel measurement for the '2Dwaist' was divided by that of the '2Dhips' in order to derive a '2DWHR'.

5.2.3 Data analysis

(a) ***Questionnaire Data***

In order to ascertain the relationship between dieting status and the measured questionnaire variables, participants were classified by virtue of their answers to the dieting status question in the questionnaire booklet. Details of this question are detailed in section 4.2.2.1. The divisions of dieting status are reiterated;

1. I am not currently dieting
2. I am currently dieting to lose weight
3. I am currently dieting to keep my weight where it is right now
4. I am currently watching my weight to avoid putting on weight

A series of univariate ANOVAs or Mann-Whitney U analyses were carried out in order to investigate any differences that exist between participants on the basis of their dieting status. Where data was considered to be inherently ordinal, such as Singh size categorization, a Kruskall-Wallis test was conducted.

(b) ***Reaction Time Data***

As in study 1, only the data resulting from the correct responses were used in the final analyses. Exclusion of incorrect responses resulted in a loss of 4.21% of the total data set.

Reaction time data were divided into 4 probe/target positions in the same way as that detailed in section 4.2.2.2. Data were then assessed in order to ascertain whether or not reaction times differed as a function of probe target position.

(c) *All Data*

Data Transformation.

In order to see whether or not the data met the assumptions of parametric analyses, they were subjected to frequency analyses. The results of this analyses showed that some of the data required transformation in order to meet these assumptions. To these ends, logarithmic (base 10 and base 10+1) transformations were carried out. Following transformation the data were re-analysed in order to see if parametric assumptions had been met. Where data were still found not to meet these assumptions, non-parametric analyses were used.

5.3 RESULTS

The definition of dieting used was again that of Cooper & Fairburn (1992a) as shown in section 3.2.2.1. Table 5.1 Depicts the number of participants falling into each of the aforementioned dieting categories.

Table 5.1 – Number of Participants in Each Dieting Category

Diet Grouping	Number of Participants
1.Not Currently dieting (ND)	17
2.Dieting to lose weight (WLD)	12
3.Dieting to keep weight where it is right now	1 'Weight
4.Watching weight to avoid putting on weight	10 Maintainers' (WM)

In view of the fact that there was only 1 participant in category 3, categories 3 and 4 were collapsed and termed 'weight maintainers'. Missing subscale data was dealt with in the same way as that detailed in section 4.2.2.2.

5.3.1 Group characteristics - questionnaire variables

Means and standard deviations were obtained for all of the measured variables. These results are displayed in Table 5.2.

Twelve-Month Diet History

(i) Twelve-Month Diet History of Current Non-Dieters

Nine of the 17 ND reported that they had not been on a diet within the past year. Of the remaining 8 ND, half reported that they had been on only 1 diet with the other half stating that they had been on two or more diets. None of the ND said that they were 'always dieting'.

(ii) Twelve-Month Diet History of Weight Maintainers

Three of the WM had been on only 1 diet during the past 12-months. The 8 remaining WM reported being on 2 or more diets within the past year, with 1 of these saying that they were always on a diet.

(iii) Twelve-Month Diet History of Weight-Loss Dieters

One of the WLD reported that they had been on 1 diet only during this period. However, 11 stated that they had been on 2 or more diets, of these 4 reported that they were 'always on a diet'. These results are summarised in figure 5.1.

Table 5.2 – Means (Standard Deviations) on Descriptive Measures for Participants as a Function of Dieting Status.

Measure	Current Weight-Loss Dieters	Weight Maintainers	Non-Dieters	F Value	P value
Age (years)	20.4 (3.5)	22.3 (2.8)	20.1 (2.1)	1.60	> .1
BMI	23.8 (4.4)	24.6 (5.4)	22.2 (3.2)	1.10	> .1
Ideal weight (Kg)	58.4 (10.1)	57.4 (10.1)	57.9 (3.9)	< 1	> .1
WHR	0.80 (0.08)	0.79 (0.06)	0.77 (0.06)	< 1	> .1
Stunkard Fig – Current Appearance (Kruskal Wallis)	4.67 (0.78)	4.36 (1.50)	3.71 (0.99)	7.01	0.03
Stunkard Fig – Ideal Appearance (Kruskal Wallis)	3.13 (0.90)	3.09 (0.83)	2.85 (0.61)	2.06	> .1
Stunkard Fig – Discrepancy (Actual-Ideal) (Kruskal Wallis)	1.54 (1.27)	1.27 (0.79)	0.85 (0.70)	3.65	> .1
Bulik BMI – Actual BMI	1.43 (5.00)	0.24 (2.00)	0.48 (1.77)	< 1	> .1
Singh – Current Size (Mean Rank)	27	21	16	7.3	0.027
Singh – Current shape (Kruskal Wallis)	0.88 (0.1)	0.77 (0.1)	0.84 (0.1)	3.67	0.04
Singh – Ideal Size (Mean Rank)	24	17	20	2.4	> .1
Singh – Ideal Shape (Kruskal Wallis)	0.78 (0.1)	0.77 (0.1)	0.76 (0.1)	< 1	> .1
Singh – Attractive Size (Mean Rank)	21	19	17	0.3	> .1
Singh – Attractive Shape (Kruskal Wallis)	0.80 (0.1)	0.74 (0.1)	0.75 (0.1)	3.11	0.06
DEBQ-R	4.1 (0.8)	3.0 (0.5)	2.6 (0.9)	14.32	0.001
DEBQ-E	3.2 (0.8)	3.2 (0.9)	2.8 (0.9)	1.33	> .1
DEBQ-X	3.4 (0.7)	3.6 (0.5)	3.4 (0.5)	< 1	> .1
EDI-BD	13.8 (6.0)	12.8 (7.1)	8.5 (6.7)	2.75	0.08
Overall sense of control	4.8 (0.7)	4.8 (0.9)	5.0 (0.4)	< 1	> .1
Negative control	3.3 (0.9)	3.2 (1.0)	3.0 (0.7)	< 1	> .1
Positive control	4.9 (0.6)	4.9 (0.7)	4.8 (0.6)	< 1	> .1
Desire for control	5.0 (0.8)	4.3 (0.7)	4.7 (0.6)	2.58	0.09
DASS-Depression (log10)	10.5 (8.9)	8.7 (6.7)	6.4 (3.9)	< 1	> .1
DASS-Anxiety (log10)	7.3 (9.4)	10.5 (11.0)	5.6 (5.6)	1.01	> .1
DASS-Stress	14.5 (8.6)	14.7 (8.5)	10.8 (6.6)	1.29	> .1
Degree of Subjective overweight (%) *	6.6 (6.0)	6.3 (8.8)	5.5 (9.6)	< 1	> .1
One or more diets in Past Year (No. of People Reporting)	11	8	8	χ^2 = 6.6	0.04

* (log10)

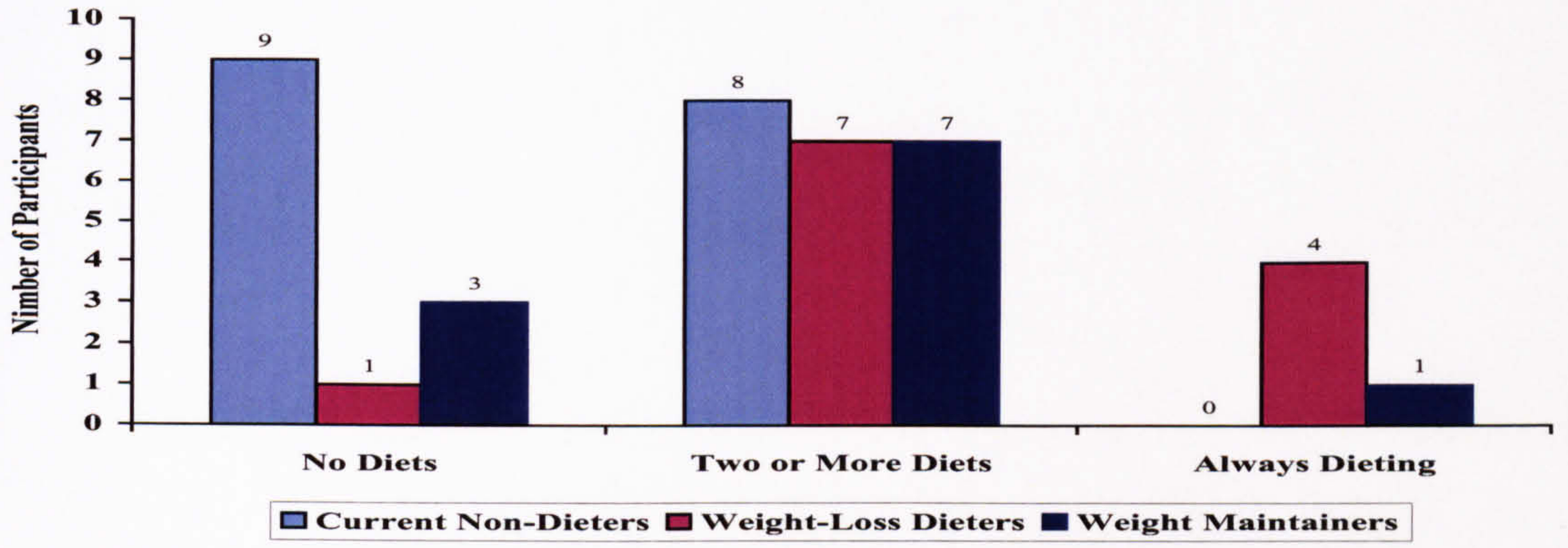

Figure 5.1 – Twelve-month diet history as a function of current dieting status.

Looking at Table 5.2 it can be seen that the groups did not differ in age, BMI, WHR or choice of ideal weight. However, when using the Stunkard et al. (1983) silhouettes there was found to be a trend towards an overall effect of dieting status on the choice of figure thought to best represent current size. Further analyses using a series of Mann-Whitney tests revealed that the difference appeared to be between WLD and ND, with WLD choosing a larger figure to represent their current size, than ND ($z = -2.68$, $p = 0.012$). When the Singh (1994) Silhouettes were used, there was found to be an overall effect of dieting group on the choice of figure chosen to best demonstrate the participants' current size. In order to further investigate the difference each of the dieting groups was compared with each of the others using a series of Mann-Whitney analyses. Only the difference between WLD and ND was found to be marginally significant, with dieters choosing a significantly larger figure to represent their current size ($z = 2.6$, $p = 0.11$). The modal value for all of the participants in this category was the overweight category, suggesting that most of the participants chose overweight figures to represent their current size. An overall effect of dieting group on the choice of figure that best represented the participants current shape was also found. Tukey's HSD showed that WLD chose a significantly less curvaceous figure than weight maintainers ($p = 0.03$).

An overall effect of dieting group was found to be marginally significant for the choice of most attractive shape. Comparisons using Tukey's HSD showed a marginally significant trend towards WLD choosing a more tubular figure as the most attractively shaped, compared with WM ($p = 0.07$). No differences were found between groups on their choice of figures to represent their ideal size and shape or the choice of silhouette deemed to have the most attractive size. As a point of interest however, the modal value for the ideal size category was normal, closely followed by underweight, and the modal value for the most attractive silhouette was underweight.

The effect of dieting group on EDI-2 BD scores was found to be marginally significant. Post hoc comparisons using Tukey's HSD suggests that WLD have a higher degree of dissatisfaction with their bodies than ND ($p = 0.09$). In addition, an overall effect of dieting group was found for the DEBQ-R. Tukey's HSD demonstrated that WLD were significantly more restrained than ND ($p = 0.001$) and WM ($p = 0.004$).

A Chi-square analysis revealed that there was a significant association between dieting status and the number of people reporting having been on more than 1 diet within the past year. More specifically, out of all of the participants reporting that they had been on more than 1 diet 41% were WLD. Thirty per cent of WM and 30% of ND reported that they had been on more than 1 diet over the past year.

A marginally significant effect of diet group was found in the participants desire for control. Post hoc multiple comparisons using Tukey's HSD showed that this effect lay mainly between WLD and WM, with WLD exhibiting a higher desire for control than weight maintainers (5.0 vs. 4.3, $p = 0.07$).

5.3.2 Group characteristics - *reaction time data*

Median reaction times for each participant in each condition were calculated. An overall mean was then calculated based on dieting group membership for each condition. These means can be seen in table 5.3.

Table 5.3 – Mean (Standard Deviation) Reaction Times for Weight-Loss Dieters, Weight-Maintainers and Non-Dieters.

	WLD (ms) N = 12	WM (ms) N = 11	ND (ms) N = 17	Difference between Conditions
Mixed Condition (Fat-Thin)	439.6 (48.2)	458.0 (50.9)	449.8 (43.4)	$F < 1, p > 0.1$
Fat Condition	438.3 (49.7)	457.8 (53.8)	449.8 (50.1)	
Thin Condition	435.6 (46.8)	454.7 (52.9)	451.6 (50.8)	
Neutral Condition	436.8 (52.0)	457.6 (57.2)	448.3 (49.8)	

A two-factor mixed sample ANOVA with bias condition (mixed vs. fat vs. thin vs. neutral) as the related samples factors and dieting group (WLD vs. WM vs. ND) as the between groups factor was conducted in order to ascertain whether or not differences existed as a function of dieting group on each of the levels of bias condition. No significant differences were evident either between the four levels of bias, or between the three levels of dieting group ($F < 1, p > 0.1$). The bias condition x dieting group interaction was also found to be non-significant ($F < 1, p > 0.1$).

Reaction Times as a Function of Dieting Group and Probe-Target Positions

(i) Mixed Condition (Fat and Thin Body Image Pairings)

Reaction times for each of the probe and target positions as a function of dieting group were obtained and are displayed in table 5.4. A three factor mixed ANOVA was then performed.

Table 5.4 – Medium Response Latencies to Probes (ms) as a Function of Dieting Group and Probe and Target Positions (Fat-Thin)

	Probe Location	Target Location	ND		WLD		WM	
			Mean	SD	Mean	SD	Mean	SD
Fat-Thin	Left	Left	450.1	43.6	441.0	47.6	444.4	38.5
(Target = Fat)	Left	Right	451.9	40.8	435.8	45.9	442.8	37.7
	Right	Left	443.7	45.8	438.2	50.8	449.2	34.5
	Right	Right	453.7	51.2	443.6	51.9	448.9	36.0

The initial ANOVA revealed no significant interaction between diet group status, body type and probe and target positions ($F < 1$, $p > 0.1$). In addition, no main effects of any of the main variables were found. Therefore, no further analyses were carried out on these data. These results indicate that none of the three dieting groups were showing bias towards either the fat or thin stimuli.

(ii) Body Condition (Neutral and Fat/Thin Pairings)

In order that the effect of dieting status and body type on probe and target positions could be assessed, reaction times were obtained for each target probe position for each of the body types as a function of dieting group status. These are displayed in table 5.5. No significant interactions between dieting group, body type, probe and target positions were found, indicating that in this study there was no relationship between dieting and biased body image processing. In addition, no main effects of any of these variables were evident (all p values > 0.1).

Table 5.5 – Medium Response Latencies to Probes (ms) as a Function of Dieting Group, Body Type, and Probe and Target Positions (Fat/Thin-Neutral)

	Probe Location	Target Location	ND		WLD		WM	
Body Type			Mean	SD	Mean	SD	Mean	SD
Fat	Left	Left	459.0	66.4	434.6	44.5	436.1	37.3
	Left	Right	450.8	55.6	432.8	48.2	442.9	37.4
	Right	Left	444.1	48.9	440.7	51.3	453.9	49.8
	Right	Right	445.2	44.3	445.1	58.4	451.0	34.2
Thin	Left	Left	452.4	57.6	435.4	50.7	443.1	35.9
	Left	Right	449.9	50.4	435.3	49.8	443.0	46.0
	Right	Left	452.9	50.6	436.8	46.3	441.5	38.7
	Right	Right	451.2	50.9	435.1	47.4	443.0	33.3

Is There an Overall Effect of Image (Body versus Neutral) as a Function of Dieting Group Status?

Analyses on reaction times for the probe and target locations for the overall body and neutral conditions as a function of dieting group revealed no significant effects (all p values > 0.1), that is, no bias either towards or away from body or neutral images was found for any of the three groups. The means for the different probe-target positions are displayed in table 5.6.

Table 5.6 – Medium Response Latencies to Probes (ms) as a Function of Dieting Group and Probe and Target Positions (Body-Neutral)

	Probe Location	Target Location	ND		WLD		WM	
			Mean	SD	Mean	SD	Mean	SD
Body-Neutral (Target = Body)	Left	Left	455.7	60.8	435.0	46.6	439.6	36.4
	Left	Right	450.3	52.4	434.0	48.3	442.9	41.1
	Right	Left	448.5	48.4	438.8	47.8	447.7	43.6
	Right	Right	448.2	45.5	440.1	52.2	447.0	33.2

5.3.3 Bias scores

Bias scores were calculated for each participant utilising the method outlined in section 4.3.1.3. Means and standard deviations were calculated for all conditions and are displayed in figure 5.2. No significant interactions or main effects were found either between conditions or dieting groups. When bias scores for each of the groups for each condition was compared against a test value of zero, no significant biases were found. However, the WLD did show a trend towards looking *away* from the fat images in fat-thin pairings.

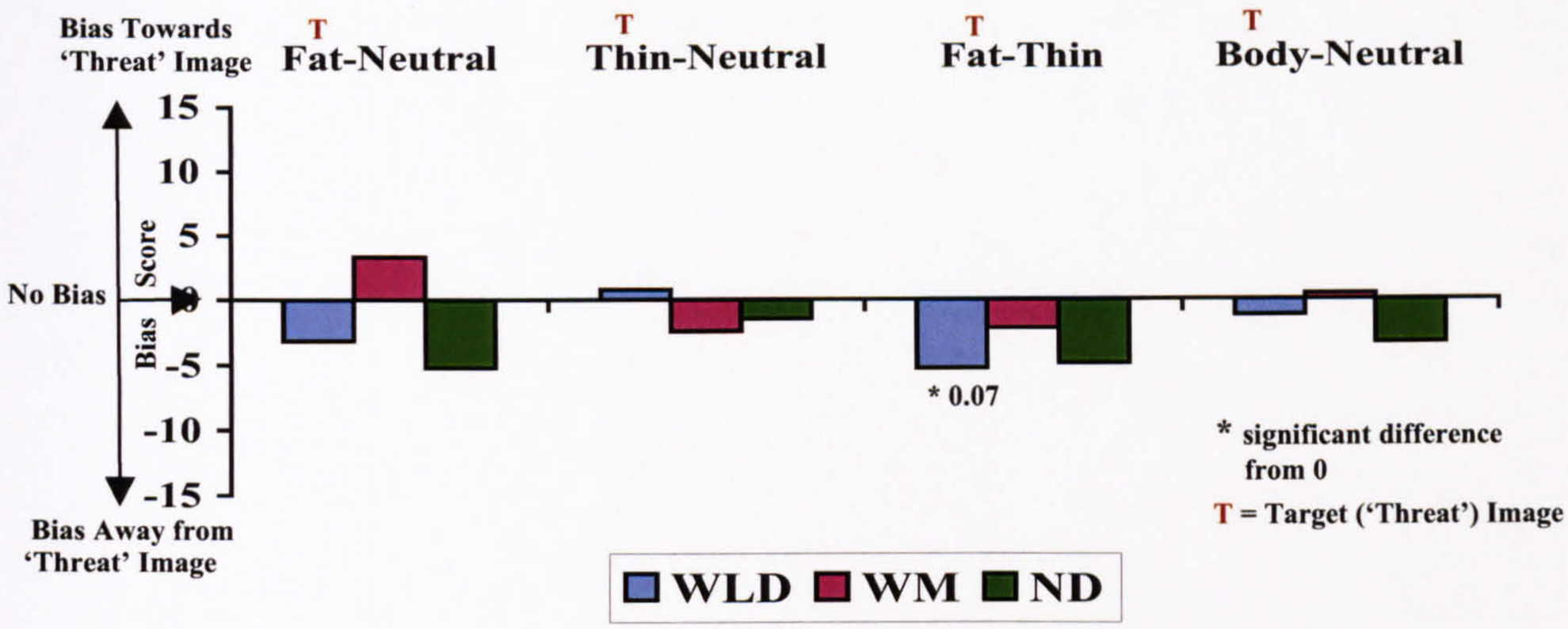

Figure 5.2 – Bias scores as a function of dieting group status

5.3.4 Body Image Ratings Task

Analyses were performed in order to see if the fat and thin images were rated differently in terms of size, attractiveness and age as a function of dieting group status. All of these results are displayed in table 5.7.

Table 5.7 – A Summary of Results for The Relationship between Dieting Group, and the Rated Size, Attractiveness and Age of the Body Images.

Condition	Analyses	F Value	P Value
1. Body Size	a. Body Size x Diet Group	5.44	0.0001
	b. Body Type (main effect)	2087.01	0.009
a. Fat Images Only	Diet Group (main effect)	4.28	0.021
b. Thin Images Only	Diet Group	1.12	> 0.1
2. Body Attractiveness	a. Body Attractiveness x Diet Group	2.38	0.12
	b. Attractiveness (main effect)	1586.60	0.0001
3. Body Age	a. Body Age x Diet Group	< 1	> 0.1
	b. Body Age (main effect)	600.21	0.0001

1. Rating of Body Size.

A main effect of body size was found, with 'fat' images being rated as significantly fatter than the 'thin' images (5.8 vs. 2.2). In addition, a significant interaction between

body size and dieting group was also found. In order to further elucidate this effect, fat and thin images were assessed separately.

(a) Fat Images

A significant main effect of dieting group was found. Post hoc analysis using Tukey's HSD test found that WLD rated the fat images as significantly fatter than the WM (5.92 vs. 5.58, $p = 0.019$). Although, the actual difference was small.

(b) Thin Images

No significant differences in size ratings were found to exist between the dieting groups in this condition.

2. Rating of Body Attractiveness

An overall effect of body type was found, with the fat images being rated as significantly less attractive than the thin images by all of the dieting groups (5.8 vs. 2.0). The interaction between body type and dieting group was not significant.

3. Ratings of Body Age

An overall effect of body type was found, with fat body images being rated as significantly older than thin body images (37.5 vs. 26.2 years). No other significant effects were found.

5.3.5 The association of 2DWHR and body size with bodily attractiveness

In order to see whether or not 2DWHR differed as a function of body type (i.e. fat or thin), an independent samples t-test was carried out. This revealed a significant difference between the 2DWHR of fat and thin body image types ($t(38) = 6.21$, $p = 0.0001$), with the fat images having significantly larger measured 2DWHRs than the thin

images (0.89 vs. 0.73). This indicates that the fat images are significantly more tubular in shape than the thin images.

Pearson correlations were used to assess the associations between 2DWHR and bodily size, age and attractiveness. Table 5.8 shows the resultant correlation matrix.

Table 5.8 - Correlations between 2DWHR, and rated bodily size, bodily Age and bodily Attractiveness

	1	2	3	4
1. 2DWHR		0.72**	0.73**	0.68**
2. BMI			0.99**	0.68**
3. Attractiveness				0.91**
4. Age				

**** correlation is significant at the 0.01 level (2-tailed)**

It can be seen that the variables are highly intercorrelated. In particular, attractiveness and BMI show an extremely strong association. For this reason it was considered inappropriate to enter this variable into a regression analysis. However, it was judged an interesting exercise to explore the lone contribution of 2DWHR in the assessment of attractiveness. Collinearity statistics indicated that this variable achieved adequate tolerance and variance inflation factor (VIF) statistics and therefore met the assumption of no perfect multicollinearity (see Field, 2003). The data were also found to meet all assumptions of homescedacity. A regression was therefore carried out. 2DWHR significantly predicted bodily attractiveness ($b = 0.73$, $t(38) = 6.57$). 2DWHR was also found to explain a significant proportion of the variance in bodily attractiveness ($R^2 = 0.53$, $F(1, 39) = 43.2$, $p = 0.001$).

5.3.6 *Error rates – do error rates differ as a function of dieting Status and body type?*

In order to ascertain whether or not error rates differed depending on diet status or type of image used, a two-factor mixed ANOVA with body type (body vs. fat vs. thin vs. neutral) as the within groups variable and diet status (WLD vs. WM vs. ND) as the

between groups variable was carried out. No significant main or interaction effects were found (all p values > 0.05).

5.4 DISCUSSION

The principal aim of the present study was to look for the presence of weight and shape related processing biases in groups of weight-loss dieters and weight-maintainers. No such biases were found. These results raise some interesting issues relating to the use of dieting as a means of characterising participants in this type of study and the utility of using dieting and restraint as interchangeable constructs.

5.4.1 Patterns of bias in non-clinically eating disordered women as a function of dieting status

The main prediction of the study was primarily based on the fact that dieting and restraint are commonly used as interchangeable terms, and measures of restraint are often used to divide participants into dieters and non-dieters. Results from this study run contrary to these predictions. Neither weight-loss dieters nor those who were watching their weight appeared to show any weight or shape related biases of attention using this pictorial visual probe task. The WLD did however, show a trend towards looking away from fat images when forced to make a choice in fat-thin pairings. Like the high-restrained and -emotional eaters they found these stimuli to be overly distracting when compared to thin images, and therefore engaged an active avoidance mechanism in order to lessen disruption to the ongoing cognitive task. The general lack of bias, however, is in line with the findings of Cooper and Fairburn (1992a) who also failed to find any evidence of weight and shape related biases of attention in normal dieters. They concluded that these biases would only be found in those with eating disorder related symptoms.

Alternatively, it may be that the main concern of dieters is not related to body dissatisfaction but to food and eating. Certainly, differentiation in concerns have been found between those with AN and BN. For example, Cooper and Fairburn (1992b) carried out a study that used the method of 'thinking aloud' or concurrent verbalisation in order to explore the cognitions thought to be of most concern to those with AN and BN. They found that those with BN were mostly concerned with weight- and shape-related issues whilst those with AN had more concerns related to food and eating. These results were further bolstered by those from an Emotional Stroop task carried out by Perpiñá, Hemsley, Treasure and De Silva (1993). They discovered that those with AN showed interference for food words only and that, conversely, those with BN showed interference for only body shape words. However, Cooper and Todd (1997) found completely the opposite effect with their participants with BN showing more interference for food words and those with AN showing interference for body shape related words. In addition, the dieting studies carried out by Keys et al. (1950) and Warren and Cooper (1988) found that dieters were excessively preoccupied with thoughts relating to food and eating. Similarly, the dieters in Jones and Rogers (2003) study displayed cognitive deficits that were found to be related to the distraction bourne from thoughts about food and eating.

The WLD in the present study, although higher in restraint than WM and ND, showed only a tendency to report higher levels of body dissatisfaction than the ND. In addition, they did not differ significantly from the other groups on any of the body size discrepancy scores. Similarly, the WLD tended to chose a more tubular shaped Singh (1994) silhouette to represent their own shape and as their choice for most attractive shape. This lack of discordance between perceived actual size/shape and ideal/attractive

size and shape silhouettes may indicate that the WLD were, on the whole, genuinely happy with their current size and shape. Alternatively, it may be more indicative of an attempt to lessen the impact of any underlying dissatisfaction with their bodies. These results offer support for the possibility that the current diet was probably not strongly directed by any major body shape/weight related concerns. Certainly, the WLD did not differ in actual BMI or WHR from the WM or the ND. It is possible that they were dieting for health or fitness reasons rather than an over-riding concern to dramatically change their shape or weight, which would explain the lack of any weight and shape related biases in the present study. The higher levels of restraint may have been indicative of only a short-term attempt to 'lose a few pounds', possibly in preparation for a particular event such as a holiday (the study was carried out in the summer term). 'Genuinely' high levels of restraint may be representative of a more long-term trait like behaviour driven by more disordered beliefs about the body. It may be that a high restraint coupled with a level of body dissatisfaction that reaches a certain threshold are necessary before these type of biases are exhibited.

5.4.2 WHR and rated bodily attractiveness, body size, and age

The results from the body rating task were as predicted, with the fat images being rated as significantly larger than the thin images, supporting the utility of the current body size split. The finding that the fat images were rated as being significantly less attractive than the thin images is also unsurprising and is in concordance with the pleasantness ratings findings reported in Chapter 3. Sadly, this result appears to support the societal 'thin is beautiful' edict discussed in section 1.1.

The discovery that the fat images were rated as significantly older (by 11 years) than the thin images is interesting and supports the findings of Han et al. (1999).

There is a long history from evolutionary theorists of BMI and WHR playing a major role in mate choice (of women by men) as well as influencing judgements of health, attractiveness and youthfulness (see Henss, 2000 and Singh 1993, 1994 and 1995 for overviews). The results from the present study found that the fat images had significantly higher 2DWHRs than the thin images. Interestingly, there was also a relationship between 2DWHR and body size, with 2DWHR increasing linearly with an increase in body size. The regression found that 2DWHR contributed over half of the variance in bodily attractiveness and therefore it seems is in agreement with previous research in this area. Given the degree of association between 2DWHR and body size it is likely that they both contribute a significant amount to the assessment of bodily attractiveness and it would be difficult to disentangle the relevant contribution of both of these variables. Caution must be observed, however, before drawing too many conclusions from these data as 2DWHR provides only an approximation of actual WHR.

In conclusion, no obvious, strong weight- and shape-related attentional biases were found for either WLD or WM. It is possible that this group is more preoccupied with food related information than that associated with weight or shape. Future work may consider using a pictorial food visual probe task in order to clarify this assumption. However, as the core of the present thesis is concerned predominantly with body image issues, the decision was made not to go down this route at this time. Instead, it was thought of more import to pursue those findings described in Chapter 4. That is, the discovery of a disengagement deficit in highly restrained eaters. This is something already being investigated in depth by anxiety researchers, and will be discussed more fully in the following two chapters along with two studies designed to more explicitly explore disengagement deficits in highly restrained eaters.

CHAPTER 6

Examining body shape specific attentional disengagement deficits in highly restrained and emotional eaters

The study outlined in Chapter 4 found that high-restrained eaters showed a pattern of weight and shape related biases that were similar to those demonstrated by clinically eating disordered individuals. These biases were not present in high-emotional eaters or those on weight-loss or maintenance diets (Chapter 5). Further, the high-restrained eaters appeared to be showing a difficulty to *disengage* from threatening stimuli. This is contrary to previous research in this area and to the ideas put forward in cognitive behavioural theories that posit that such biases are a result of increased vigilance for threat. This is a new finding for the field of eating disorders. However, the possibility that biases are as a result of disengagement difficulties is not new to those in the area of anxiety research where a body of evidence has built up to support the theory. Chapters 6 and 7 will outline two studies that examine the disengage component of attention in a more direct fashion. The following sections will aim to outline the background and rationale for the upcoming studies.

6.1 BACKGROUND, RATIONALE AND METHODS - A MORE DETAILED LOOK AT DISENGAGEMENT

It has been suggested that threatening material has the propensity to hold attention. If true, this would imply that disorder relevant biases occur at a later stage of attention than initial orienting (Fox et al., 2001). This idea ran contrary to traditional theories that had assumed that threatening material had the tendency to preferentially *draw* attention in vulnerable individuals. The basis for this new way of thinking came from a theory of attention posited by Posner and Peterson (1990). Rather than look at the attentional

system as a unitary structure, they divided it into three main subsections involved with the disengagement of attention, attentional shifting, and the reengagement of attention at a new location.

The differentiation of increased vigilance from a difficulty to disengage may seem a trivial exercise. However, Fox et al. (2001) assert that for those who study clinical conditions of anxiety (and this is also relevant for other clinical disorders), a fuller understanding of the mechanisms involved in attention may be useful in the development of more relevant treatment approaches.

Fox et al. (2001) believed that the possibility of emotionally led attentional biases occurring due to a disengagement difficulty was something that had not been adequately investigated. They therefore carried out a series of studies in order to examine this idea in more depth. As well as acknowledging the problems associated with the Stroop task, Fox et al. believed that interpretative difficulties were also inherent in the visual probe paradigm. They suggested that it was possible that participants were adopting one of two strategies when undertaking the visual probe task. Firstly, because both locations are task relevant, participants could be attending equally to both locations. In addition, they believed presentation times of 500 ms to be too long allowing participants to speedily shift their attention between the two locations. If this was the case it may mean that the stimuli of interest are never really in an unattended position. Koster, Verschuere, Crombez & Van Damme (2005) also believe that over this time period it is possible for an individual to make numerous attentional shifts. Similarly, Mogg, Millar and Bradley (2000) consider that during this time it is feasible that individuals initially orient towards the neutral stimuli in the neutral-threat pairings and

then shift the focus of attention towards the threat stimuli and consequently show an apparent bias towards this stimulus.

6.1.1 Measuring disengagement – an alternative to the visual probe task

In order to circumvent the potential problems with the visual probe task, and to more adequately assess the disengage component of attention, Fox et al. (2001) carried out a series of tasks that utilised a modified version of the exogenous cueing paradigm or covert orientating of attention task (COVAT) originally devised by Posner (1980).

Typically, participants are asked to fixate on a central stimulus, a target then appears on one or other side of this stimulus and the participant is asked to respond to its presence as quickly but as accurately as possible. Usually, the participant is given a cue (often a flashing light) as to where the target will appear. This can be valid (i.e. it correctly cues the upcoming target) or invalid (i.e. the cue appears in a location opposite to that of where the target is to appear). When the cue appears in an invalid location, attention must first disengage from the cue, shift focus and then reengage on the new location (i.e. the target). Only after this has occurred can a manual response be made. This results in slower reaction times owing to the extra processing time required to carry out this process. In order to investigate the effect of threatening stimuli on the disengage component of attention Fox et al. replaced the flashing light with either a threatening or neutral stimulus. These stimuli took the form of line drawings or photographs of faces with either threatening or neutral expressions. They predicted that non-clinically disordered, highly anxious participants (but not controls) would take longer to respond to invalidly cued targets when the cue was a threatening face. That is, reaction times would be expected to increase on invalid threatening trials over and above the normal increases expected for responses to invalidly cued targets. This prediction was

confirmed, but only when the cues were presented for *250* ms. When cue presentation was only 100 ms *all* of the participants demonstrated longer reaction times for threatening cues. They concluded that there might be a universal automatic propensity to dwell on threatening material when it was presented for only a brief period. However, when longer processing times are allowed, less anxious individuals will disengage more rapidly, whereas highly anxious individuals maintain their attention on the threatening stimulus. This may be a result of deeper processing of threat-related material by highly anxious individuals. This effect has been termed the *enhanced dwell-time hypothesis* (Fox et al., 2002). Fox et al. (2002) put forward a provisional theory to explain this pattern of processing. Firstly, they thought that initial orienting was largely an encapsulated process that was not influenced by the type of stimulus engaged. Secondly, after the initial orienting process, they believe that the attentional system looks to prioritise certain important stimuli for more extended processing. So, particularly in highly anxious participants this will be biased towards threatening stimuli. However, the system may not make the distinction between mild and more dangerous types of threat. Fox et al. (2001) believe that this propensity is likely to both maintain and heighten the current state of anxiety. A possible outcome of this process is that vulnerable individuals may be more likely to go on to develop clinical manifestations of anxiety. Other studies that have used similar tasks have produced comparable results (e.g. Yiend & Mathews, 2001; Fox et al., 2002 and Amir, Elias, Klumpp & Przeworski, 2003).

Despite the criticisms levelled at the visual probe task by Fox et al. (2001), its use in attentional bias research continues. Researchers in this field have developed ways of using the data derived from this task to discriminate between delayed disengagement and increased vigilance (e.g. Koster et al., 2004; see section 4.3.1.4 for method), and

have been successful in identifying disengagement difficulties in various populations (e.g. Roelofs et al., 2005 - chronic back pain sufferers; Koster, et al., 2005, 2004 – anxiety). Using the visual probe methodology Koster et al. (2005) found differential responding in high and low trait anxiety individuals when faced with highly threatening (HT) and mildly threatening (MT) stimuli. All individuals attended to the HT stimuli when presented for 100 ms, suggesting that this was a universal and automatic reaction and supports those results found by Fox et al. (2001). However, at 500 ms Koster et al. (2005) discovered that only the highly anxious individuals demonstrated such a bias. This was thought to be a result of a difficulty to *disengage* from the threat stimuli and is in line with the results for high-restrained eaters outlined in Chapter 4 of this thesis. Finally, when stimuli were presented for 1250 ms the highly anxious individuals attended away from or showed avoidance from both sets of threatening material. Koster et al. (2005) believed that this result could lend support to the vigilance-avoidance theory. Here, an initial vigilance for threat is followed by avoidance over longer time periods. It is thought that such a pattern is responsible for the maintenance of anxiety. This is considered to occur because highly anxious individuals only allow themselves to be exposed to threat for short periods of time and therefore never get a chance to truly habituate to these stimuli (Koster et al., 2005). Koster et al. (2005) suggest that the initial attention for threat leads to a heightened anxious state in these already anxious individuals, which in turn motivates them to avoid any further exposure to threat in order to reduce the anxious state.

Similar studies using visual probe tasks have not shown comparable results (e.g. Mogg, Bradley, de Bono & Painter, 1997 and Bradley, Mogg, Falla & Hamilton, 1998). Although, Bradley et al. (1998) did suggest that their results were indicative of the fact

that biases are more robust at shorter intervals (they used 500 ms and 1250 ms intervals) and that it is likely that they diminish over time. Similarly, Mogg, Millar and Bradley (2000) carried out a modified visual probe task on individuals diagnosed with generalised anxiety disorder (GAD). Pairs of threatening and neutral face pairs were displayed for a period of 1000 ms. The task was broken down into two components that occurred concurrently. For the reaction time component of the task participants were asked to respond using manual key presses, to the presence of a probe that appeared in the position of one of the two preceding images (i.e. a typical visual probe task). The second component of the task involved monitoring the direction and latency of the participants' initial eye movements towards either of the displayed images. Interestingly, the data from the eye movement component indicated that participants with GAD, but not normal controls or depressed participants, shifted their gaze more quickly and more frequently towards the threatening faces compared to the neutral faces. However, when the manual RT data from the visual probe component was analysed *no bias* towards threatening faces was found. Mogg et al. (2000) believed that whereas the eye movement data provided evidence for an initial orienting towards the face stimuli, the data gathered from the visual probe component of the task was more a reflection of spatial attention at the *end of the display time* of the stimuli. Moreover, Mogg et al. suggested that it was possible that whereas anxious individuals had a reasonably reliable initial automatic bias towards threatening material, the maintenance of attention over periods of one second or more were more prone to the influence of *strategic* processing and were therefore less consistent in their manifestation.

Other studies that have used eye movement registration to examine naturalistic viewing patterns support the idea that highly anxious individuals initially orient towards

threat-related material and show a pattern of avoidance over longer periods. For example, Calvo and Avero (2005) displayed two pictures simultaneously on a screen for 3 seconds. One valenced image was paired with a neutral (household object) image. The valenced image could be positive or negative with equal probability. Calvo and Avero measured eye fixation probability and gaze duration. Initial orienting of attention was defined as the probability of first fixation on the target picture in comparison to the control picture. First fixation was defined as "the first location of the eyes for at least 160 ms after leaving the fixation point" (Calvo & Avero; p. 441). Early attentional engagement was assessed by measuring gaze duration in the first 500 ms. Late attentional engagement and avoidance were assessed by monitoring gaze duration across the remaining five, 500 ms intervals and calculating the probability of fixation between the first and final time frames. They found that non-clinically disordered, highly anxious individuals showed evidence of initial and early engagement (up to 500 ms) with negative and positive stimuli, but no attentional differences between participant groups were found between 500 and 2000 ms. However, the group differences did become apparent again between 2000 and 3000 ms, when high anxious individuals showed avoidance of the negative stimuli. Moreover, they found that the trend towards avoidance began as early as 1500 ms. This led Calvo and Avero to conclude that in the early stages of processing attention is still held by threatening information and that only at later stages does avoidance begin to occur. They believe that the disengagement difficulties found at earlier stages are indicative of slowed disengagement or prolonged engagement and that later avoidance is more a result of faster disengagement or facilitated avoidance. Hermans et al. (1999) found similar results using spider phobics. They paired pictures of spiders with images of flowers. They discovered that in the

initial 500 ms both spider phobics and controls looked more at the spider pictures. However, after this time the attention of the spider phobics gradually moved away from the spider images. Finally, in the final two time frames (2000-2500 and 2500-3000 ms) the spider phobics looked significantly more towards the flower images. The control participants showed a more constant viewing pattern tending towards a greater proportion of time spent looking at the spider images. Again, in a similar study using threatening, happy and neutral face stimuli, Rohner (2002) found that during the first 1800 ms high and low trait anxious participants tended to spend more time viewing the threatening faces compared to happy faces. Subsequent to this, only the high trait anxious individuals were found to avert their gaze away from threatening faces more than happy faces. Fox et al. (2002) and Yiend and Mathews (2001) when they increased stimulus onset asynchronies (SOA; time between the onset of a stimulus and onset of the target) to 960 and 2000 ms respectively found *no* differences in responses between high and low anxious participants. These findings show some agreement with the previous research in that Calvo and Avero and Rohner also failed to find evidence for differential responding between 500 and 2000 ms. It appears that that the time period singled out for measurement is key to the finding of some degree of differential responding between anxious and non-anxious groups. Interestingly, Calvo and Avero illuminate the vast discrepancy in results in the field of anxiety related bias research and conclude that the effect is not as solid as often thought. They also believe that a crucial factor in the discrepancy found between results is the time-course of measurement.

As the visual probe task was not *specifically* designed for use as a test of delayed disengagement, the present study sought to use a more explicit method. In their final study of the series Fox et al. (2001) described a simple disengagement task that they

believed more directly investigated the disengagement component of attention. In this task, threat and neutral words were presented, one at a time centrally on a computer screen. Participants were then required to respond verbally to peripheral target stimuli (letters) that could appear with equal probability at one of four possible locations. After each stimulus word had been on the screen for 600 ms, a target would appear. The word remained on the screen until a response had been made or until 2000 ms had elapsed. The basic prediction was that high but not low anxious participants would be slower to respond to the target when it appeared alongside threat related words compared to neutral words. This prediction was supported. Georgiou et al. (2005) carried out an identical task using fearful facial expressions and obtained similar results. A similar paradigm is adopted in the final two studies of the present thesis. However, only two possible peripheral locations were used in order to simplify the procedure and minimize the number of overall errors. The first experiment reported in the present chapter, followed the form of the Fox et al. (2001) study with some minor modifications. The second study investigated the effect of leaving a 'gap' between the appearance of the stimulus and the appearance of the target. Typically, a gap between the offset of stimulus and the onset of the target will allow disengagement to take place before the target appears (Danckert & Maruff, 1997). However, manipulating the duration allows a more accurate estimate to be made regarding the timescale of the disengagement process in the non-clinically eating disordered individuals (Chapter 7).

6.1.2 A closer examination of disengagement in highly restrained and emotional eaters

6.1.2.1 Modifications and Predictions

The stimuli in this first study were initially presented for only 200 ms before the target appeared on the screen. The previous section discussed the possibility that those times longer than 500 ms may allow more than one shift of attention to occur (Koster et al., 2005; Fox et al., 2001; Mogg et al., 2000). Therefore, to limit the possibility of participants making more than one shift of attention before the target appeared on the screen the time was set at 200 ms.

If high-restrained participants view the fat-related images as threatening then it is possible that they will process them more deeply and may find it difficult to shift their attention away from them even when a target appears in the periphery. This will result in longer target response times. Low-restrained participants may be more likely to respond to targets as soon as they appear on the screen as they are unlikely to process body images at as deep a level as the more body concerned participants.

Therefore, it is predicted that high-restrained but not low-restrained participants will exhibit significantly longer reaction time latencies following fat images compared to thin or neutral images. Based on the results from Chapter 4, this result would not be expected to occur so strongly in high-emotional eaters. No specific predictions will be made as regards reaction times on the medium stimuli trials, as it is as yet unclear how high-restrained eaters view such stimuli. It is possible that they may be viewed as neutral in affect. Alternatively, they may be seen as being mildly threatening, and therefore may elicit a less prominent but similar result as the fat-related stimuli.

6.2 METHOD

6.2.1 Participants

A total of 42 female participants took part in the study. They were drawn from the undergraduate and postgraduate student population of the University of Bristol and were recruited by the following means:

1. Department of Experimental Psychology Research Database

This is made up of individuals who expressed an interest in taking part in psychological research. All members of the database were gathered in response to an advertisement placed on the Bristol University Careers Advisory Website Job page.

2. Food and Drink Research Database.

This is made up of a group of individuals (students and staff), recruited at the University of Bristol Freshers Fair 2004. All of those recruited had expressed an interest in taking part in food, drink and dieting related research. An e-mail detailing the present study (in the form of the information sheet – see appendix 16) was sent out to all female members aged between 18 and 45 years old. All were offered £5 for taking part in the study.

3. Poster Recruitment

Posters and Flyers advertising the study were placed at various points throughout the University of Bristol. Participants were offered £5 for taking part in the study.

4. Experimental Hours Scheme

See section 4.2.1 for details of this scheme. All participants were awarded 1.5 experimental hours credit on completion of the study.

The mean age of the participants was 20.7 years (SD = 3.82; Age range = 18 – 39 years).

The majority of the participants (76.2%) described their ethnic origin as 'White – British'. Seven percent said that they were from 'other' white backgrounds (including white Irish) and a further 4.8% said that they were 'Mixed White and Asian'. The remaining 7.2% participants were from other ethnic groups.

All participants had normal, or corrected to normal vision. Participation was voluntary and complete anonymity was assured by assigning each of the participants their own study code. All participants provided informed consent before commencing the study procedures.

6.2.2 Measures

6.2.2.1 Self-Report Questionnaire Measures

All questionnaire measures used in the present study were identical to those in study 3 apart from the addition of the following:

1. ***Body Shape/Weight Concerns***

(a) The Body Shape Questionnaire (BSQ; Cooper, Taylor, Cooper & Fairburn, 1987). This scale was developed in order to address the lack of a suitable means of measuring an individual's *concern* about their body shape. Cooper et al. (1987) believed that existing measures served only to measure *dissatisfaction,* either with the body in general or with particular body parts, an example being the body dissatisfaction subscale of the EDI-2 (Garner, 1991). As concern with body shape is a major feature of those with AN and BN and, as the *level* of concern varies considerably between sufferers, the authors believed that it was important to develop a questionnaire that assessed the "phenomenal experience of concerns about body shape" (p. 486), or their perception of "feeling fat". In addition, as the level of concern may impact on the subsequent behaviours (e.g. the

initiation of purgative behaviours or excessive restraint of food intake), Cooper et al. felt it necessary to incorporate an assessment of both the background and outcome of such concerns. The resultant questionnaire comprises 34 items. The authors found the measure to have good concurrent validity, correlating moderately highly with the body dissatisfaction subscale of the EDI (Garner, Olmstead & Polivy, 1983) and total score on the Eating Attitudes Test (EAT; Garner & Garfinkel, 1979). Discriminant validity was also found to be satisfactory, with the scale successfully differentiating community cases of individuals diagnosed with BN from non-cases, as well as distinguishing self-reported 'weight-concerned' women from those declaring that they had little or no concern with weight-related issues. Typical scores derived for thee groups are illustrated in table 6.1.

Table 6.1 – Mean (SD) BSQ Score for Clinical and Non-Clinical Groups (from Cooper et al., 1987)

Participant Group	Mean (SD)
BN	136.9 (22.5)
Probable BN	129.3 (17.0)
Definite Non-Cases of BN	71.9 (23.6)
Weight and Shape 'Concerned'	109.0 (21.2)
Weight and Shape 'Unconcerned'	55.9 (14.4)

A study carried out by Rosen, Jones, Ramirez, and Waxman (1996) assessed the three-week test-retest reliability of the BSQ using three groups of women. Firstly, those who had been referred to clinic with body image concerns, secondly, a group of obese individuals who were seeking help with weight loss and finally, a control group of non-clinical adults and college students. They found the BSQ to have high test-retest reliability (0.88).

The participants are asked to respond to a set of statements that seek to measure perceptions of their body shape and any behavioural outcomes that may results from any concerns they may have relating to body image. The measure is only concerned with feelings and behaviours over the 4 weeks prior to filling in the questionnaire. The

respondent is given a 6-point Likert scale with which to indicate the frequency of a given behaviour or feeling from 1 ('never') to 6 ('always'). Examples of questions used to measure this construct are; *Have you been afraid that you might become fat (or fatter)?* and *Have you vomited in order to feel thinner*? Responses on all items are summed to give a total score. A high score indicates an elevated concern with body shape.

(b) The Body Checking Questionnaire (BCQ; Reas, Whisenhunt, Netemeyer & Williamson, 2002).

This is a 23-item self-report measure that purports to measure the frequency of a series of body checking behaviours. These behaviours have been identified as commonly reported by those suffering from clinical or subclinical eating disorders. It claims to be the only measure of this type that looks specifically at the behavioural manifestation of a negative body image (Reas et al., 2002). Using a sample of 149 female college students and 16 women with clinically diagnosed eating disorder, the authors confirmed that the BCQ functioned as a higher-order measure of body checking. In addition, they found that the measure could be divided in to 3 stable and highly correlated sub factors measuring checking of overall appearance (OA), specific body parts (SBP) and idiosyncratic checking (IC) specifically.

The 3 sub factors were shown to demonstrate satisfactory internal consistency with Cronbach's Alphas of 0.88 (OA), 0.92 (SBP) and 0.83 (IC). Two week test-retest reliability using a random sub sample of 54 from the original 165 was also found to be good for the total score ($r = 0.94$) and the 3 sub samples; $r = 0.94$ (OA); $r = 0.91$ (SBP) and $r = 0.90$ (IC). The BCQ total score was correlated with the BSQ (Cooper et al., 1987), Eating Attitudes Test-26 (EAT; Garner & Garfinkel, 1979) and the Body Image

Avoidance Questionnaire (BIAQ; Rosen, Srebnik, Saltzberg, & Wendt, 1991) in order to assess concurrent validity. The BCQ correlated highly with both the BSQ ($r = 0.86$) and the EAT-26 ($r = 0.70$) indicating a relationship between increased body checking, a negative attitude towards weight and shape and disordered eating. Similarly, the BCQ correlated highly with the BIAQ ($r = 0.66$) showing that body checking was related to body image avoidance. Discriminant validity was assed in 3 ways. Firstly, mean scores from eating disordered individuals were compared with the non-clinical college sample; they were found to be significantly different (82.1 vs. 56.0, $p < 0.001$). Secondly, the college sample was divided into 'less concerned' and 'very concerned' groups using a cut-off score of 110 (1 SD above the mean for the non-clinical sample). The very concerned group were found to have significantly higher scores than the 'less concerned' group (74 vs. 49.0, $p < 0.001$). Finally, the college sample was divided into dieters and non-dieters. The dieters demonstrated significantly higher scores on the measure than the non-dieters (70.3 vs. 54.2, $p < 0.001$). Owing to the adequate discriminant validity shown in the non-clinical sample the authors advocate its use in the study of body image in non-disordered populations. Given this assertion, the BCQ was thought to be an appropriate and useful measure for use in the current study.

In its original format, respondents are asked to circle one of 5 possible responses that relate to the frequency of engagement in a variety of body checking behaviours. These responses range from 1 (never) to 5 (very often). However, given the importance attributed to the avoidance of seeing the body/body parts (Fairburn et al. 1999; Fairburn et al. 2003), the current measure does not actually seem to differentiate those who select 'never' because they are unconcerned as regards their body image, and those who select this response because they are *actively avoiding* the behaviour owing to the resultant

distress derived from carrying out such a behaviour. Shafran, Fairburn, Robinson and Lask (2004) recently developed a self-report measure of body checking and avoidance in order to explore the differences in these behaviours between women with a clinically diagnosed eating disorder and those without an eating disorder. Their measure utilised a 6-point forced choice response scale as follows:

0 (not checked at all – not interested)
1 (Checked less than once a week)
2 (Checked 1 – 6 times a week)
3 (Checked 1 – 2 times a day)
4 (Checked 3 or more times a day)
5 (Avoided doing so because of possible distress)

This rating scheme appears to more adequately distinguish those who do not check their bodies because they are unconcerned about how they look and those who avoid checking because of the distress it causes them. Therefore, it was decided to adapt the scale originally developed by Reas et al. (2002), by replacing the original rating scheme with that proposed by Shafran et al. (2004).

A score is derived for each of the subscales by obtaining the sum of all of the items in that subscale. A high score indicates a high level of checking/avoidance of that domain. A total body checking score is obtained by summing the scores for all of the items. A higher score indicates a high level of overall checking/distress related avoidance. Only the total scores will be assessed in the current study.

2. ***Self-Esteem***

The Rosenberg Self-Esteem Scale (SES; Rosenberg, 1989)

This is a 10-item scale that purports to measure the concept of self-esteem. It is composed of a set of 10 belief statements referring to various aspects of self-esteem.

A great deal of research carried out on those with clinical eating disorders has consistently found that they demonstrate low levels of self-esteem in comparison with non-disordered groups (Griffiths et al., 1999). However, Griffiths et al. report that results derived from comparisons between those with different eating disorders are inconsistent. They believe that this inconsistency is owing to the variety of different instruments used to measure this construct. In order to ascertain which measure of self-esteem would be most appropriate for those with clinical eating disorders, Griffiths et al. carried out research comparing the construct and convergent validity of the two most popular self-esteem scales. They administered the tests to 3 eating disordered groups (AN, BN and EDNOS). The tests under investigation were the SES and the Coopersmith Self-Esteem Inventory (SEI; Coopersmith, 1967). The Morris Rosenberg Foundation (University of Maryland Department of Sociology, 2004) advise that information relating to validity for the scale should be based on studies that have used participant samples similar to the population under study. The present study aimed to assess self-esteem in relation to its effect on body image and eating behaviours (restrained and emotional eating patterns). Therefore, in order to find the most appropriate measure for the present study, it was thought appropriate to use the scale deemed by Griffiths et al. to be the most suitable for eating disordered groups. In order to test construct validity both the SES and SEI were correlated against a number of measures that assessed dieting disorder psychopathology and depression. Griffiths et al. found the SES to elicit higher correlation coefficients with the measured variables than the SEI. The SES was also found to more successfully predict the criterion variables following multiple regression analyses. In order to assess convergent validity, the scales were correlated against the ineffectiveness subscale of the EDI-2 (Garner, 1991). This scale measures people's feelings of insecurity, worthlessness

and inadequacy and was therefore thought by the authors to be similar in nature to the construct of self-esteem. Again, the SES demonstrated stronger convergent validity than did the SEI. Griffiths et al. therefore recommended the SES for use in those with dieting disorders. Given this information it was decided to use the SES in the present study.

Participants are asked to indicate on a 4-point Likert scale, the extent to which they believe each of the 10 statements applies to them. The scale ranges from 0 (completely true) to 3 (not true at all). Possible scores extend from 0 to 30, with higher scores indicating a higher level of self-esteem. Five of the items are reverse coded in order to limit response bias.

6.2.2.2 Disengagement Task

The Stimuli

The body-related images used in this task depicted women in swimwear. The images were taken from the database of 105 images originally prepared by the author for use in the pilot and visual probe procedures. In total, 84 images of this type were used. In addition, 40 neutral images depicting household objects were used as a control. These were identical to those outlined in section 4.2.2.2.

In addition, Figure 3.1, (section 3.3.2) obtained when regressing pleasantness on ratings of size, was used to identify 9 further thin images that did not fall on the main regression line. Specifically, these 9 images were those rated as very thin but less attractive than the images used in the previous two studies. The aim was to see if these images would 'catch' and hold the attention of a particular group of participants.

The 'fat' images were again identical to those used in the previous two studies. In addition, 6 further images were added in order to ensure that numbers of images in all conditions were near equal. These extra images were taken from the 'fat' category

elicited from the original database of 105 images used in the pilot study. Images were chosen on the basis of their clarity, and lack of excessively distractible swimwear. A further group of 29 images from the original database of 105 were used in the present experiment. These images were those categorised as 'medium' in the pilot study. The aim was to see if these images would elicit responses on the tasks that would be midway between the 'fat' and 'thin' condition. Sizing and preparation details for all of the images was identical to that detailed in sections 3.2.2.2. Examples of the 'new' fat and 'thin' images are illustrated in figure 6.1. Examples of the medium image group are displayed in figure 6.2.

Figure 6.1 – Representative examples of the 'new' fat and thin images

Figure 6.2 – Representative examples of the medium images

Apparatus

The overlap task was created using E-prime version 1.1.4.1 (Psychology Software Tools, Inc.). All details regarding apparatus are identical to that detailed in section 3.2.2.2.

Design

In order to investigate the relationship between restraint and emotional eating and the time taken to disengage from female body (threat-related) images compared to control images, 4 conditions were used as follows:

1. **'Fat' Condition** – Twenty-six 'fat' images were used in this condition.

2. **'Medium' Condition** – Twenty-nine images of 'medium' sized women were used in this condition

3. **'Thin' Condition** – This condition consisted of 29 images of 'thin' women.

4. **Neutral Condition'** – This condition consisted of 40 images of household objects.

Practice Trials

A total of 8 practice trials, consisting of repeats of two of the images not used in the main study, was run in order to familiarise participants with the task.

Presentation and Timing of Stimuli

The stimuli were presented over the course of 3 screens as follows;

Screen 1

A central fixation star (* size 48 Arial, bold) appeared in the centre of the screen flanked by two identical empty boxes (size 2.5 x 2.5 cm). The outline of each of the boxes was 1 pixel thick ('1 pixel box') and coloured black. The interior of the box was white in order to match the background screen. This screen remained in view for 800 ms. It was immediately followed by screen 2.

Screen 2

The two boxes remained in identical positions to those of screen 1. The central fixation cross was replaced by one of the test stimuli. This screen was viewed for only 200 ms and was immediately replaced by screen 3.

Screen 3

This screen was essentially identical to screen 2. However, a box with an outline of 5-pixel thickness ('5 pixel box') replaced one of the original '1 pixel boxes'. The effect of this was to give the impression that the outline of box had 'thickened'. At the same time as this 'thickening' occurred, either an upright or upside down 'T' appeared in the centre of the 5-pixel box ('T' or '⊥' size 9, Arial). The 'T' was deliberately small enough so that the participant had to divert their attention away from the central image in order to make a decision as to its orientation. A pictorial representation of the screens can be observed in figure 6.3

Randomisation of Stimuli

For each of the test stimuli, the '5-pixel box' could appear in either the left or right hand position on the screen with equal probability. The 'T' could appear either upright or inverted in this box with equal probability. This resulted in 4 possible presentations for each of the test stimuli. Using this method of presentation, the total number of trials summed to 116 (29 images x 4 presentations) for both the 'thin' and 'medium' conditions and 104 (26 images x 4 presentations) for the 'fat' condition. The number of trials in the neutral condition totalled 160 (40 images x 4 presentations). In total each participant saw 496 trials. This is illustrated in table 6.2.

Table 6.2 – All possible Screen Positions for Each of the Test Stimuli

Box 1	Test Stimuli	Box 2	'T' Position (within 5 pixel box)
1 Pixel Box	Image 1	5 Pixel Box	Upright
1 Pixel Box	Image 1	5 Pixel Box	Inverse
5 Pixel Box	Image 1	1 Pixel Box	Upright
5 Pixel Box	Image 1	5 Pixel Box	Inverse

NB: The target 'T' always appears in the 5-pixel box

The presentation of trials was randomised by E-prime, so that a different order was presented to each participant. In order that participants could rest their eyes during the task, the trials were divided into 4 separate blocks, with 124 trials in each block. E-prime was programmed to pause after 124 trials had run, and as the presentation of trials was already randomised, their was an equal likelihood that each of the test stimuli could appear in any of the four blocks with equal probability for each individual participant.

The participant restarted the task by pressing any key on the keyboard.

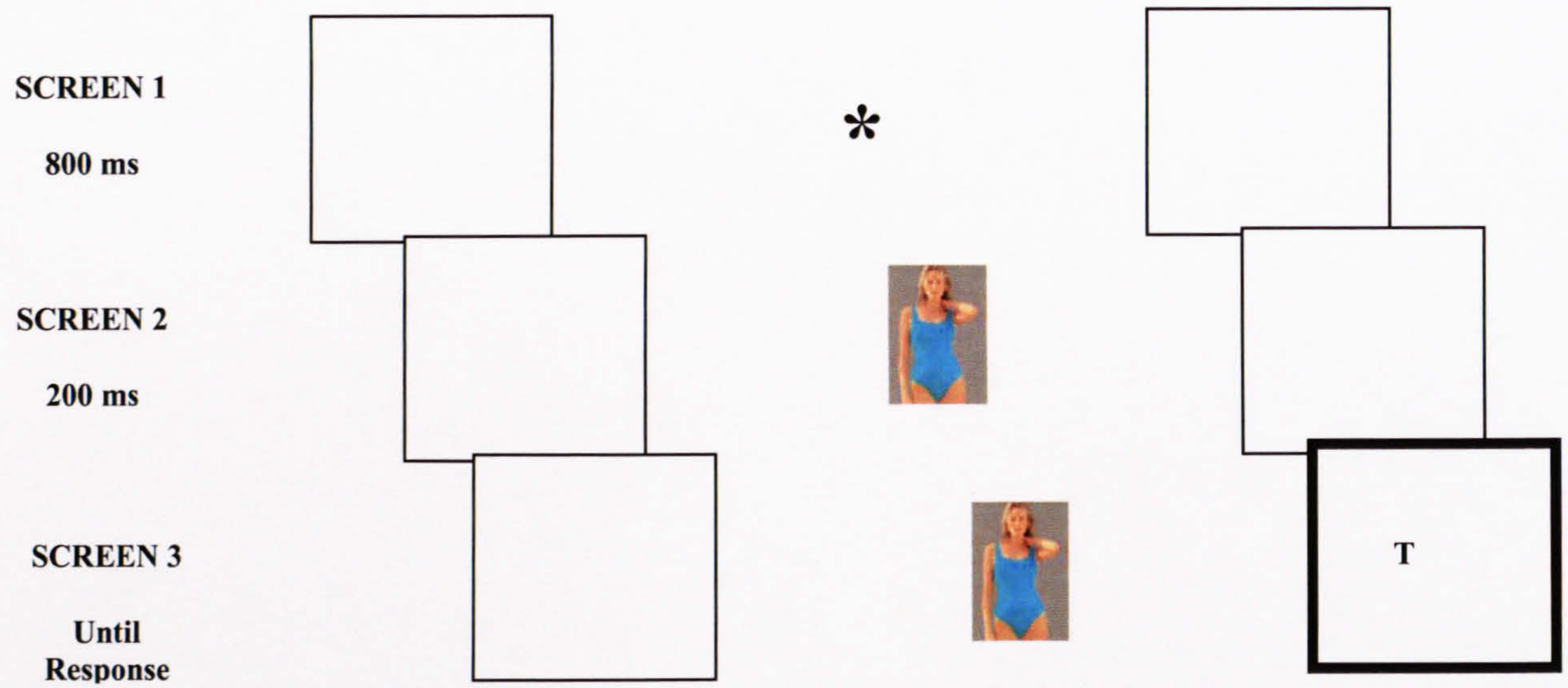

Figure 6.3 – Schematic representation of the sequence of screens in the disengagement task

6.2.2.3 Body Image Ratings Task

The Stimuli

All of the body stimuli used in the overlap task were rated on the following dimensions.

1. Ratings of size – the participants were asked to rate the shape of the bodies on a scale from 1 (extremely thin) to 7 (extremely fat).

2. Ratings of Attractiveness – the participants were asked to rate the attractiveness of the shape of the bodies on a scale from 1 (extremely attractive) to 7 (extremely unattractive).

Timing and Randomisation of Body Stimuli Presentation.

See section 3.3.2.2 for information relating to timings and randomisation of the stimuli presented in the ratings tasks.

Procedure

On arrival to the testing room, all participants were provided with a copy of an information sheet that detailed the procedures involved in the study (appendix 16). Although those who were contacted via the database or who responded to poster advertisements had already been sent a copy of this sheet, they were given the opportunity to re-read the sheet. They were also provided with a copy of the consent form for the study (identical to that seen in appendix 14). They were instructed to ask questions if there was any aspect of the information or consent sheets they were unhappy with or did not fully understand. Once the participants stated that they understood what was being asked from them, they signed the consent sheet. After informed consent had been given, the participants were given a verbal explanation of the overlap task and informed that they would have the opportunity to take part in a short practice run to

ensure that they fully understood what was involved in the task. Each participant was sat in their own private booth at a distance of 55 cm from the computer screen. They were given the following instructions:

> You will first be presented with a central fixation star ('*') with an empty white box on either side. Please try to keep looking at the '*'. Eight hundred ms (just over 1/2 a second) later, the '*' will be replaced by a picture. Please try to keep looking at this central picture. Almost immediately after the picture has appeared, the edge of one of the boxes will expand (get thicker) and a target (either an upright or upside down 'T') will appear in the centre of one of the boxes. As soon as you see the target appear in the box, press the 'Z' key if the T is the right way up or the 'M' key if the T is upside down. Please try to do this as quickly but as accurately as possible.

Following a series of pilot runs it was decided to label the keys with the appropriate 'T' as participants found it difficult to recall which key to press. All participants were also given on-screen instructions before the start of both the practice and test trials. On completion of the practice trials participants were given the opportunity to voice any concerns regarding the completion of the task. Participants were informed that the task was broken down into 4 sections and that it was advisable for then to take a few minutes break in between each of the sections. The main task was commenced once all of the participants stated that they were happy to begin.

On completion of the overlap task the participants were given a short break before commencing the ratings task. They were told that they would now be give two short experiments in which they would either have to rate the attractiveness or body size of the women that they had just seen in the overlap task. They were told that each of the women would appear alone on the screen for only 500 ms followed by a screen that would ask them to rate the women on a scale from 1 (extremely thin/attractive) – 7 (extremely fat/unattractive). The order of completion of ratings task was randomly assigned to each participant. Once these two tasks had been completed the participants were given questionnaire booklet 1 or 2 to complete, again assignment of the booklet

was random. As in the previous studies, the participants were told not to dwell too long on any one question but to give their first impressions of how they were feeling. When each of the participants completed the booklet they were taken individually to a private room in order that measurements of weight, height, waist and hip could be taken. They were then debriefed verbally on the nature of the study and given a debriefing sheet to take away with them (appendix 17). In the event that anyone should feel they needed to seek advice regarding an eating or emotional problem, each participant was given a sheet of useful contacts before they left (see appendix 15). Before leaving, all participants were thanked for taking part and were either paid or instructed that experimental hours credit would be awarded later that day.

6.2.3 Data analysis

(a) *Questionnaire data*

A total number of 42 women participated in the present study. Where a participant had either by choice or in error missed answering only 1 item of any particular sub scale of the questionnaire measures, the mean for that sub scale was taken by summing the answered items within that sub scale. Where they had missed answering more than one item of any sub scale then no score for that sub scale was recorded.

As in the study outlined in Chapter 4, the women were classified as either high- or low-restrained eaters based on a median split of their total scores on the DEBQ-R (van Strein et al., 1986). Therefore, those participants who had a total score of less than 2.40 were classified as 'low-restrained' eaters and those with a total score of 2.40 and above as 'high-restrained' eaters. Table 6.3 shows the difference in means and standard deviations attained by each of these subsequent groups.

Table 6.3 – Mean (Standard Deviation) Restraint Scores For High- And Low-Restrained Eaters

	Number	Mean
High-Restrained	20	3.29 (0.81)
Low-Restrained	22	1.84 (0.43)

In order to assess the relationship between emotional eating and the measured variables, participants were again classified as either high- or low-emotional eaters based on a median split of their total scores on the DEBQ-E (van Strien et. al., 1986). Therefore, those participants who had a total score of less than 2.89 or less were classified as 'low-emotional eaters' and those with a total score of 2.89 and above as 'high-emotional' eaters. Table 6.4 shows the difference in means and standard deviations attained by each of the emotional eating groups.

Table 6.4 – Mean (Standard Deviation) DEBQ-E Scores for High- and Low-Emotional Eaters

	Number	Mean
High-Emotional eaters	21	3.63 (0.62)
Low-Emotional eaters	21	2.16 (0.51)

(b) Reaction Time Data

As in previous studies, only the data resulting from correct responses were used in the analyses. Exclusion of incorrect responses resulted in a loss of 5.79% of the total data set. The within groups analyses of body type for the main reaction time analyses involved fat, medium, thin and neutral images. Analyses of body size and attractiveness ratings did not involve neutral images.

(c) All Data

Data Transformation

Details pertaining to the methods used are identical to those of section 4.2.3c.

6.3 RESULTS

6.3.1 Restraint status

6.3.1.1. Group characteristics – questionnaire variables

Means and standard deviations were obtained for each of the measured variables and a series of univariate ANOVAs or Mann-Whitney U analyses were carried out in order to investigate any differences that exist between participants on the basis of their restraint status. These results are displayed in Table 6.5.

(a) Diet History over the past 12 months:

As in section 4.3.1.1, exploratory analyses of the 12-month diet history data revealed that there were less than 5 counts in many of the diet frequency categories. Therefore, the categories were again collapsed into just two:

(a) Those who had not been on a diet during the last 12 months

(b) Those who had been on 1 or more diets during the last 12 months. This category also incorporated those who reported that they were always on a diet and therefore, could not specify any particular number. Dividing the participants in such away resulted in approximately equal numbers in each category.

(i) 12-Month Diet History of High-Restrained Participants:

Twelve participants stated that they had been on 1 or more diets during the past 12 months. In addition a further 4 participants reported that they were 'always dieting'.

Only 6 of the participants said that they had not been on a diet within the last year.

(ii) 12-Month Diet History of Low-Restrained Participants:

Only 4 participants said that they had been on 1 or more diets during the past 12 months.

None of the respondents stated that they were 'always dieting'. The majority (16) of this

group reported that had not been on a diet within the past year. These results are summarised in figure 6.4

Table 6.5: Means (Standard Deviations) On Descriptive Measures For High- And Low-Restrained Participants

Measure	High-Restrained	Low-Restrained	F Value	P value
Age (years) (log10)	21.4 (4.8)	20 (2.3)	1.31	> .1
BMI	22.4 (3.1)	21.2 (2.1)	2.13	> .1
Ideal weight (Kg)	56.8 (7.7)	58.0 (5.0)	< 1	> .1
WHR	0.79 (0.03)	0.75 (0.05)	9.49	0.004
Stunkard Fig – Current Appearance	4.0 (1.1)	3.5 (1.2)	Z = -1.30	> .1
Stunkard Fig – Ideal Appearance	2.7 (0.7)	3.1 (0.6)	Z = -1.97	0.05
Stunkard Fig – Discrepancy (Actual-Ideal)	1.32 (0.84)	0.40 (1.05)	Z = -2.80	0.005
Bulik Discrepancy Score BMI – Actual BMI	-0.60 (2.00)	- 0.74 (1.97)	< 1	> .1
Singh – Current Size (Mean Rank)	24	20	Z = 1.58	> .1
Singh – Current shape	0.83 (0.1)	0.81 (0.09)	< 1	> .1
Singh – Ideal Size (Mean Rank)	19	24	Z = 1.33	> .1
Singh – Ideal Shape	0.78 (0.11)	0.77 (0.08)	< 1	> .1
Singh – Attractive Size	21	22	Z < 1	> .1
Singh – Attractive Shape	0.78 (0.09)	0.79 (0.10)	< 1	> .1
DEBQ-E	3.2 (0.8)	2.5 (0.9)	7.05	0.01
DEBQ-X	3.6 (0.6)	3.3 (0.6)	2.01	> .1
EDI-BD	12.1 (5.6)	4.9 (4.2)	22.22	0.001
Overall sense of control	4.8 (0.7)	5.2 (0.8)	2.54	0.12
Negative control	3.4 (1.0)	3.0 (1.0)	2.05	> .1
Positive control	5.0 (0.7)	5.3 (0.9)	1.83	> .1
Desire for control	4.7 (0.9)	4.7 (0.7)	< 1	> .1
DASS-Depression	10.9 (9.6)	4.7 (4.7)	6.89	0.012
DASS-Anxiety	6.8 (6.2)	4.7 (4.5)	1.60	> .1
DASS-Stress	12.0 (7.4)	9.1 (8.0)	1.49	> .1
Self-Esteem	20.0 (5.3)	22.5 (5.5)	2.20	> .1
Body Checking and Avoidance	55.2 (16.5)	36.0 (7.0)	23.09	0.001
Body Shape Questionnaire	103 (30)	65 (20)	22.62	0.001
Degree of Subjective overweight (%) (Log10)	4.5 (4.7)	2.8 (3.2)	1.14	> 0.1
One or more diets in Past Year (No. of People Reporting)	16	4	$\chi^2 = 14.2$	0.001

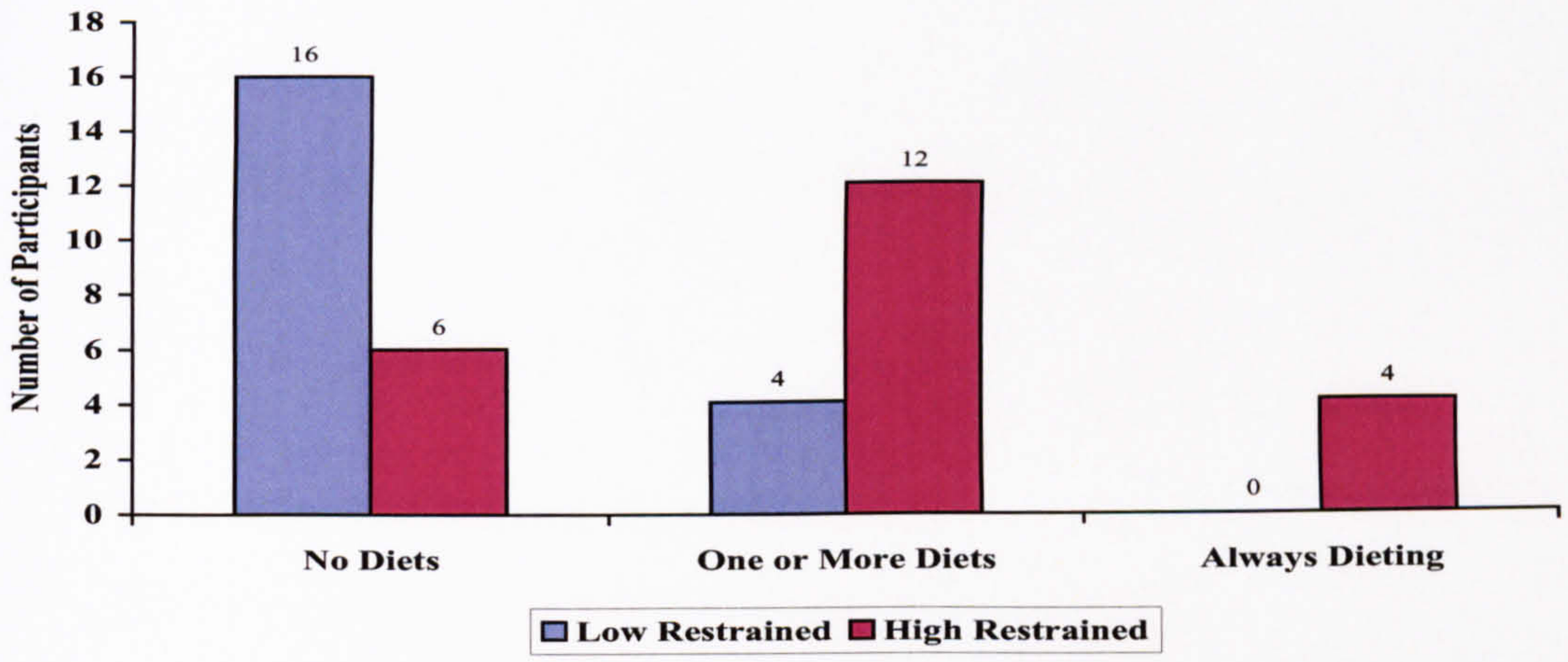

Figure 6.4 - Twelve-month diet history as a function of restraint status

As illustrated in table 6.5, no significant differences in age, BMI or ideal weight were found to exist between high- and low-restrained participants. The high-restrained participants were found to have significantly larger WHRs than low-restrained eaters indicating that they had slightly more tubular body shapes. However, Levene's statistic showed that the variances were not equal for this measure ($F(1,36) = 17.83$, $p < 0.001$) so a Mann-Whitney U analyses was carried out on the data, which confirmed the significant difference between the groups ($z = -2.93$, $p = 0.003$).

The high-restrained participants generally showed a greater degree of body dissatisfaction and weight and shape concern than low-restrained eaters, as evidenced by higher EDI-2-BD and BSQ scores. They also exhibited more body checking and avoidance behaviours than the low-restrained group and chose a significantly smaller Stunkard et al. (1983) silhouette to represent their ideal size. Furthermore, the high-restrained eaters demonstrated a significantly greater discrepancy between their ideal and perceived current shape than low-restrained eaters using the Stunkard et al. discrepancy measure indicating their preference for a smaller body size. In contrast, no such discrepancy was found when the Bulik et al. (2001) discrepancy measure was used.

Additionally, the groups showed no significant differences in their choice of figure for any of the Singh (1994) Silhouettes and were found not to differ significantly on their perception of their degree of overweight.

The high-restrained eaters were found to demonstrate significantly higher scores on the DEBQ-E and to have been on significantly more diets over the past 12 months compared to the low-restrained eaters. In addition, the high-restrained participants were found to be significantly more depressed than low-restrained eaters and showed a trend towards having feelings of a lower overall sense of control in their lives. Despite, this the two groups did not differ significantly on their reported levels of self-esteem.

6.3.1.2. Group characteristics - reaction time data

Differences in Attentional Dwell Time Between Body Type and Neutral Image Conditions as a Function of Restraint Status

Median reaction times for each participant in each condition were calculated. An overall mean was then calculated for each of the conditions. The high-restrained group were found to be significantly more depressed than the low-restrained group. This raised the concern that this may have an effect on the reaction times, as depression has on occasion been found to cause slowing. Therefore, an ANCOVA with depression as a covariate was considered. However, depression was found not to correlate significantly with overall reaction times for either the high- or low-restrained eaters (all p values > 0.05). It was therefore considered unnecessary to partial out depression from the reaction time analyses.

New stimuli were added to the original fat and thin stimulus sets in this study. In order to explore the effect that these additions would have on the overall result, two sets of analyses were carried out. Firstly, reaction times were obtained for the original stimuli

only. Secondly, an analysis that included both old and new stimuli was carried out. The means, along with the key significant results for the combined data set are illustrated in figure 6.5.

(a) Original Data Set Only

In order to see whether or not restraint status would effect attentional dwell time as a function of body image type; a 2 x 4 mixed ANOVA was carried out on the reaction time data. An overall effect of body type was found ($F(3, 120) = 3.43$, $p = 0.03$; Greenhouse Geisser correction). In addition, there was a trend towards high-restrained eaters being significantly slower to disengage from the images than low-restrained eaters ($F(1, 40) = 3.03$, $p = 0.09$). No interaction between body type and restraint was found ($F < 1$, $p > 0.1$).

In order to elucidate further the exact nature of these differences, a Bonferroni comparison was performed on all possible pairwise comparisons. Although, it is often unnecessary to look at differences between all variables; it was considered appropriate to do so in this case as one of the main aims of the study was to investigate the effect of body images on disengagement. Therefore, the Bonferroni comparison was considered to be the most appropriate approach in this case, as it would ensure that the probability of type 2 errors were reduced. Irrespective of level of restraint, participants took significantly longer to disengage from the thin images than the medium images (657.3 vs. 645.1 ms, $p = 0.014$). No other significant results were found.

(b) Original and New Stimuli - Combined Data Set

The same analysis was carried out for the combined data set. This also showed a main effect of body type (Greenhouse-Geisser corrected values). The overall effect of restraint status was found to be marginally significant ($F(1, 40) = 2.88$, $p = 0.097$), with high-restrained eaters showing slower reaction times over the four conditions than low-restrained eaters. No interaction between restraint status and body type was found ($F < 1$ $p > 0.1$).

In order to further elucidate the main effect of body type, a set of Bonferroni comparisons were carried out. Participants took significantly longer to disengage from thin images than medium images.

As results for both data sets were virtually identical, only the data for the combined data set was used to build figure 6.5. To more adequately demonstrate the differences between reaction times for the body types, the y-axis minimum has been set at 600 ms.

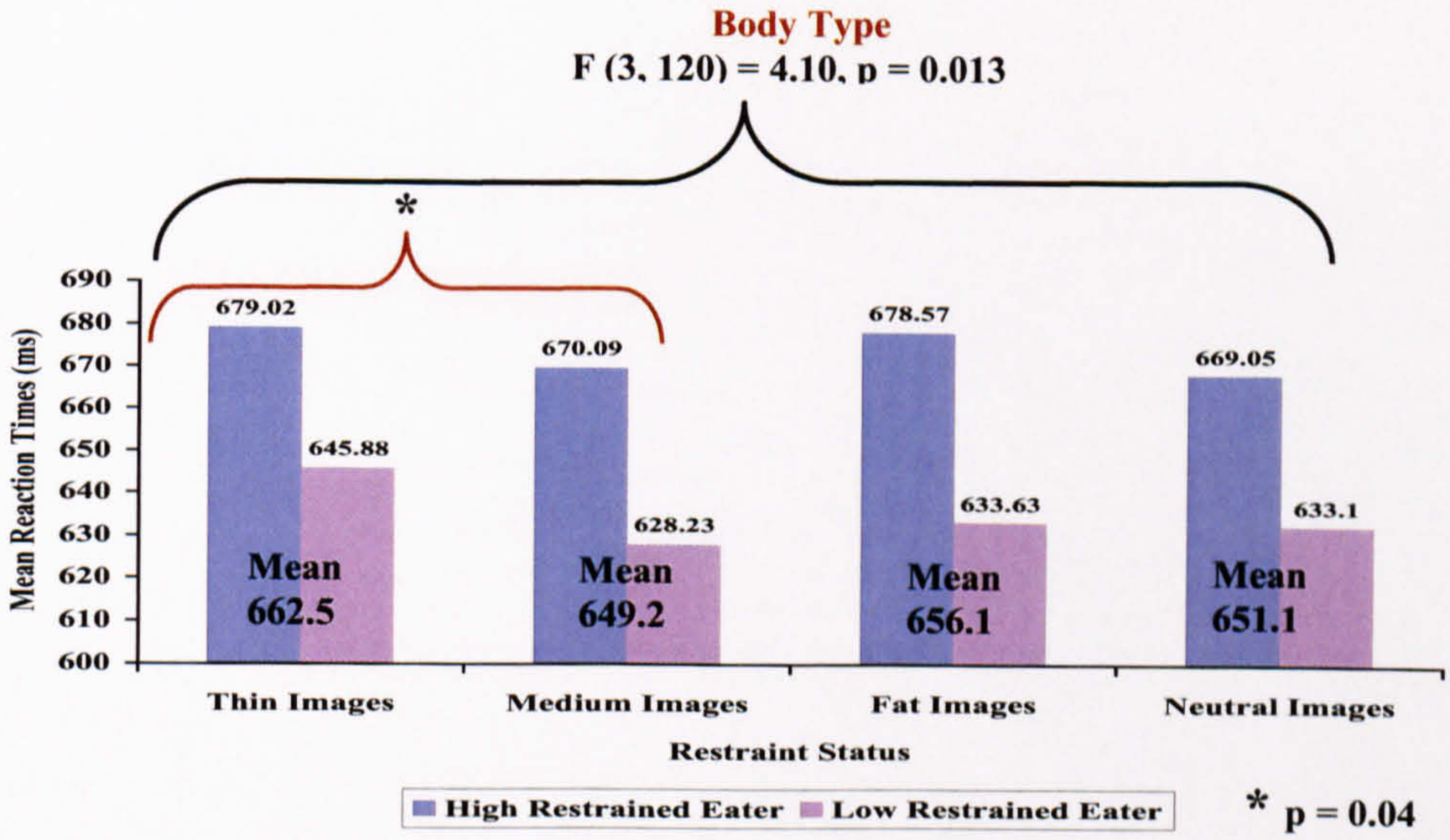

Figure 6.5 – Mean reaction times as a function of restraint status and body image type

Differences in Attentional Dwell Time between the Overall Body Condition and Neutral Condition as a Function of Restraint Status

(a) Original Data Set Only

Median reaction times for each participant were obtained and means for each of the conditions calculated. For the following analyses reaction times for each of the body types were collapsed into one category named 'Body' and were compared with reaction times obtained for the neutral condition images. The purpose of such an analysis was to see whether or not high- and low-restrained eaters would differ on the time taken to disengage from body images generally compared to neutral images. A two factor ANOVA with restraint status and Image type found no interaction or main effects ($p > 0.1$). There was a trend towards high-restrained eaters taking longer to disengage from images overall ($F(1, 40)$, $p = 0.095$).

(b) Combined Data Set

No interaction effect ($F < 1$, $p > 0.1$) or overall effect of Image type was found. However, there was a trend towards high-restrained eaters taking longer to disengage from images than low-restrained eaters ($F(1, 40) = 2.86$, $p = 0.099$).

These results are illustrated in figure 6.6.

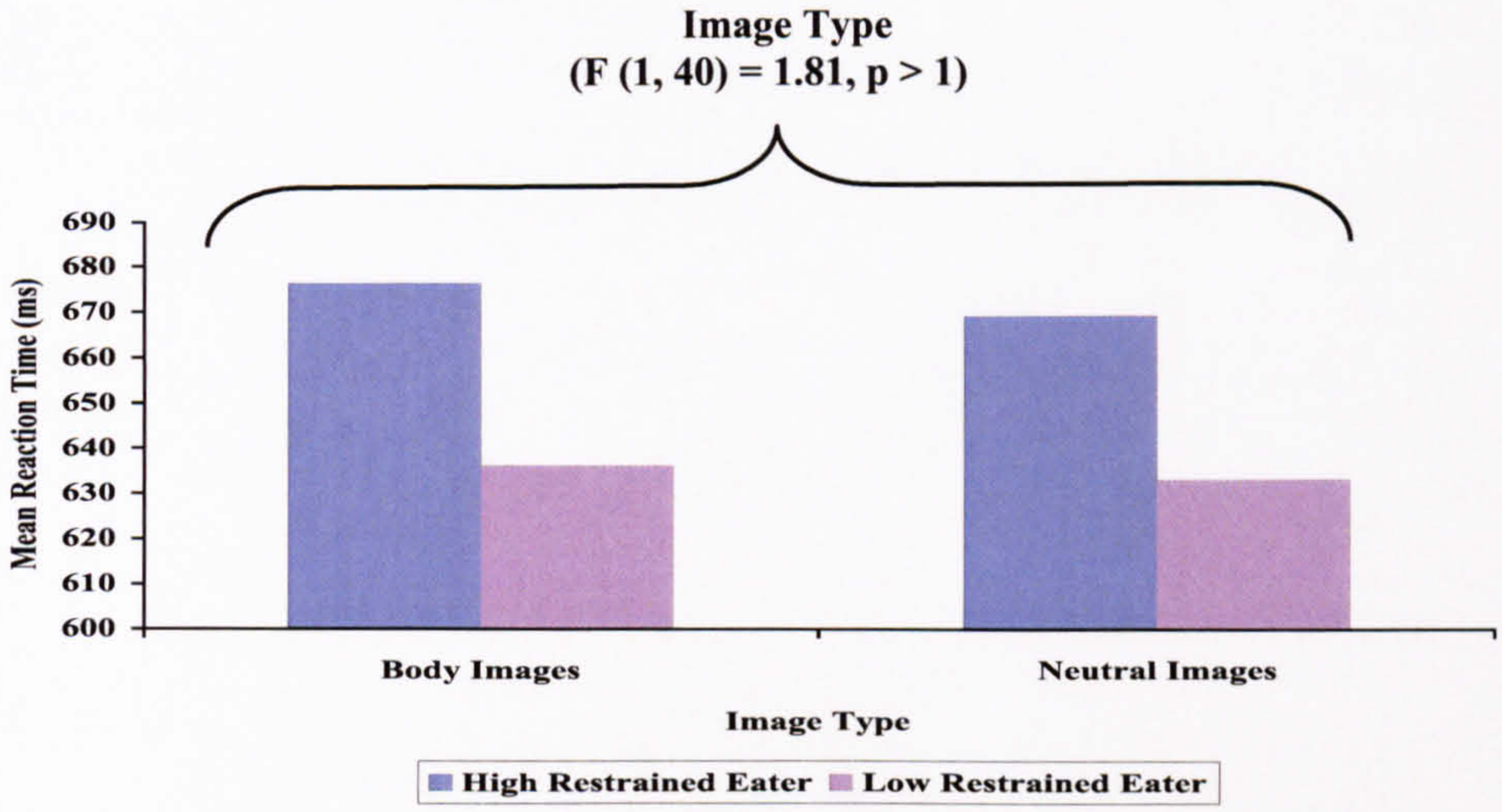

Figure 6.6 – Mean reaction times as a function of restraint status and condition type

6.3.1.3 Body image ratings

1. Rating of Body Size.

In order to confirm the utility of the body type division and to investigate any likely differences in ratings between high- and low-restrained eaters, overall mean ratings were obtained for each body image type. These means and the key significant results of subsequent analyses are illustrated in figure 6.7. Analyses revealed an overall effect of body type. Bonferroni contrasts found that the 'fat' images were rated as significantly fatter than both the 'thin' and the 'medium' images. In addition, the 'medium' images were rated as significantly fatter than the 'thin' images. These results successfully supported the utility of the body type split. No overall effect of restraint status ($F (1, 40) = 1.8$, $p > 0.1$) or interaction between body type and restraint group was found ($F < 1$, $p > 0.1$).

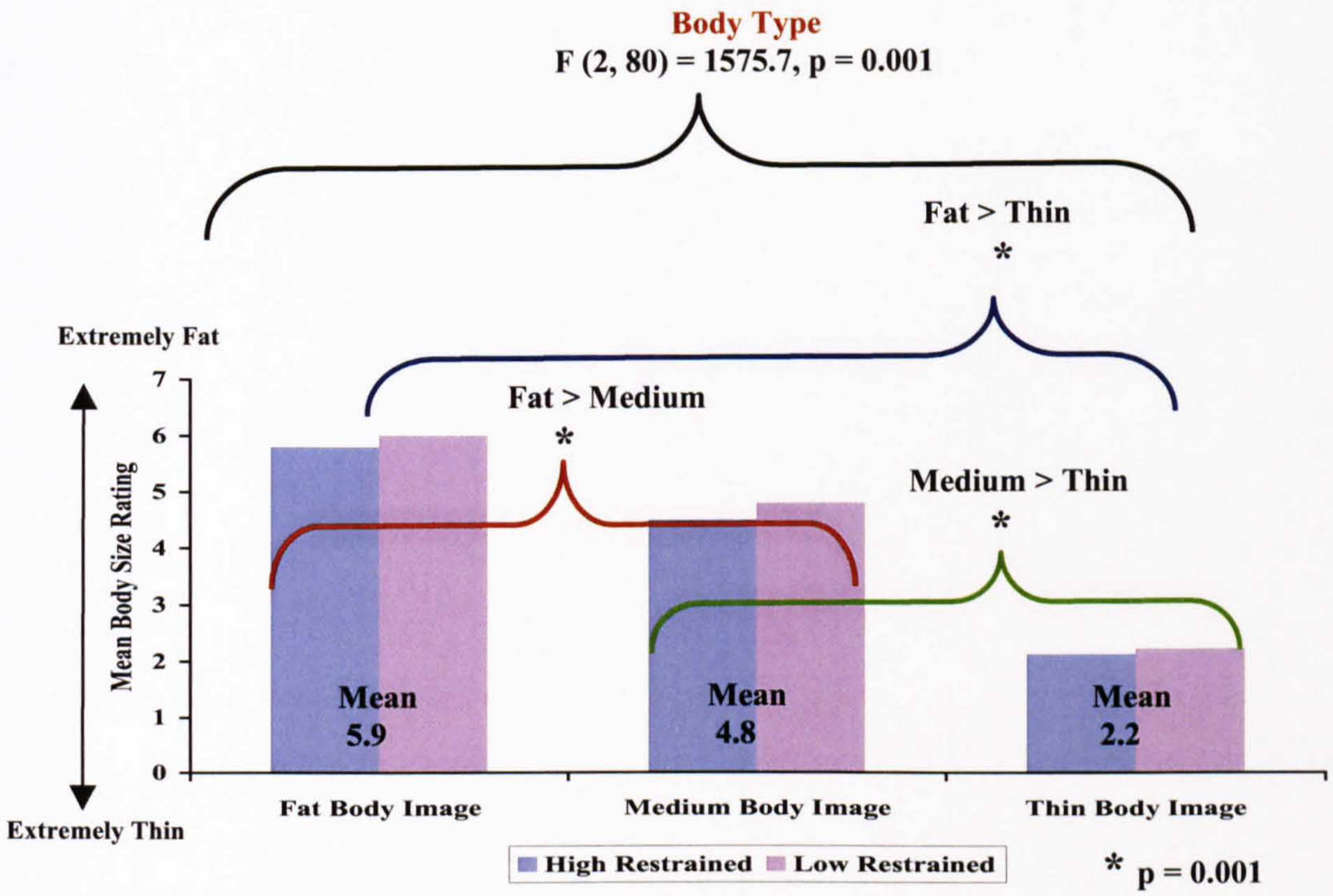

Figure 6.7 – Mean body size ratings for fat, medium and thin body images as a function of restraint status

2. Rating of Body Attractiveness

In order to see whether or not the 3 body types differed in their obtained ratings of attractiveness, and to ascertain any differences in ratings as a function of restraint group, mean attractiveness ratings were obtained for each body image type. These means along with key significant relationships are illustrated in figure 6.8. An overall effect of body type was found. Bonferroni contrasts found the 'fat' images to be rated as significantly less attractive than both the thin and the 'medium' images In addition, the 'medium' images were rated as significantly less attractive than the 'thin' images. There was also a trend towards high-restrained participants rating all of the images as more attractive than low-restrained participants (4.11 vs. 4.35; $F(1, 40) = 3.26$, $p = 0.079$). No interaction between body type and restraint status was found ($F(2, 74) = 1.80$, $p > 0.1$).

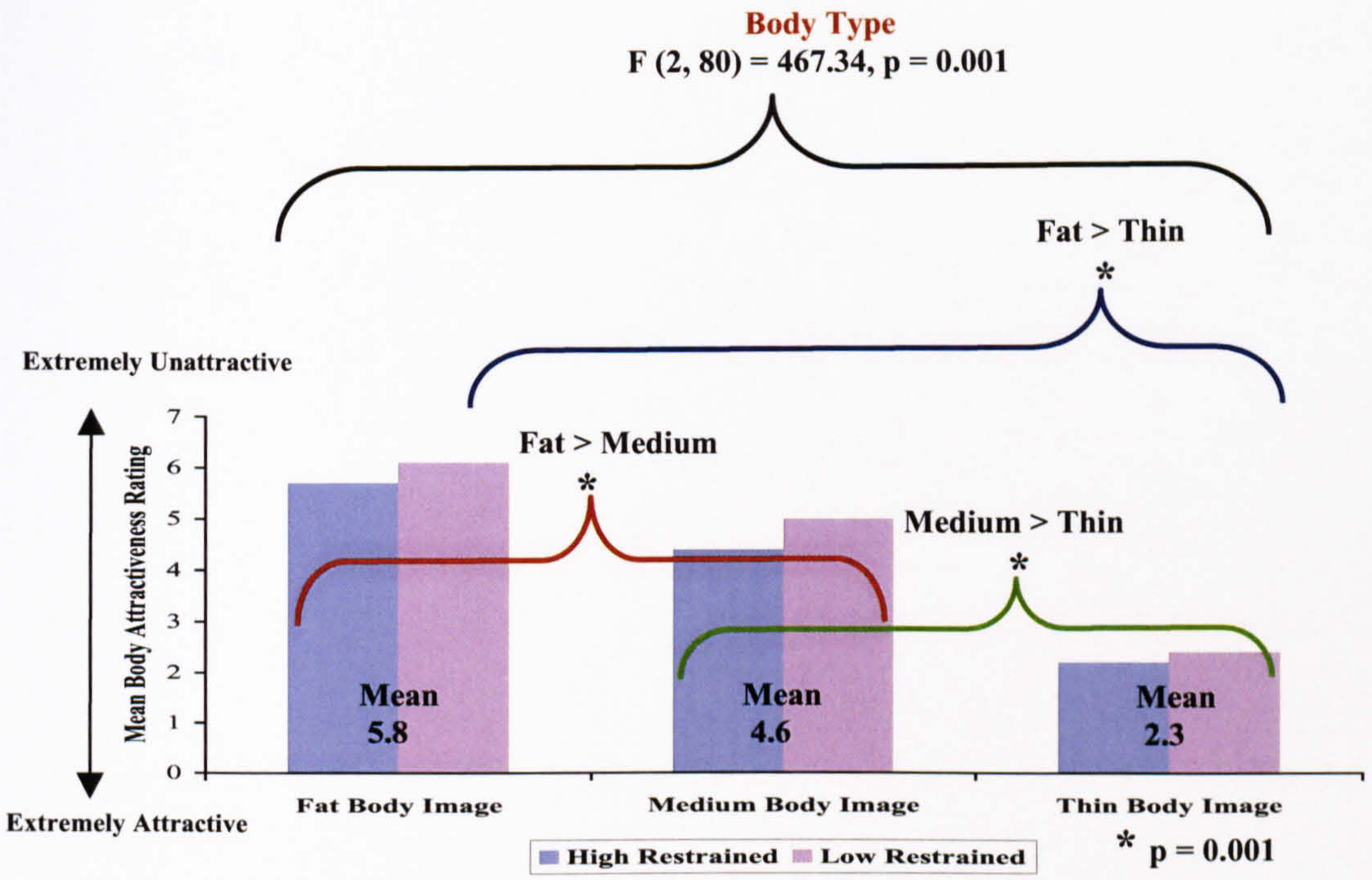

Figure 6.8 – Mean body attractiveness ratings for fat, medium and thin body images as a function of restraint status

An additional exploration was made on the attractiveness ratings for the original and new images. Overall means were taken for each of the image ratings for size and attractiveness across all participants. These are shown in figure 6.9. It can be seen that the new thin images were rated as thinner but less attractive than the original thin images. However, there did not appear to be any difference in either size or attractiveness ratings for the original and new fat images.

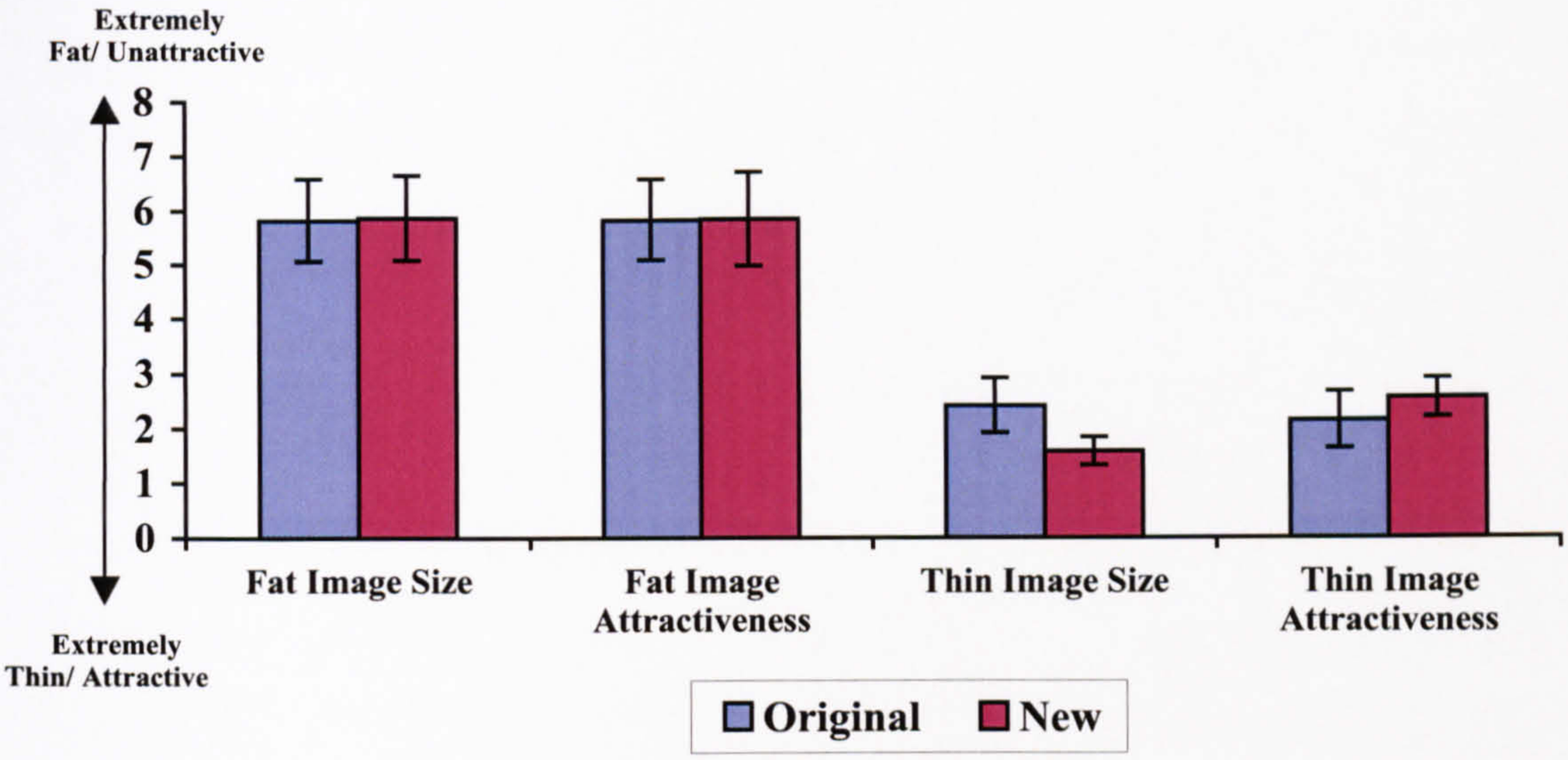

Figure 6.9 –Mean (sd) size and attractiveness ratings for original and new image sets

6.3.1.4 Error rates - do error rates differ as a function of restraint status and body type?

All analyses on error rates for both the restraint and emotional eating conditions, was carried out on the combined data set only. A two-factor mixed ANOVA with restraint status (high vs. low) as the between groups factor and image type (thin vs. fat vs. medium vs. neutral) was carried out on the error rate count (i.e. number of trials where the wrong decision was made). Only a significant main effect of image type was found ($F(3, 99) = 8.92$, $p = 0.0001$). Further analysis using Bonferroni contrasts showed that there were significantly more errors in the neutral condition than either the thin (10.8 vs. 6.7, $p = 0.001$), fat (10.8 vs. 8.1, $p = 0.03$) or medium (10.8 vs. 7.3, $p = 0.001$) conditions.

6.3.2 Emotional eating status

6.3.2.1 *Group characteristics – questionnaire variables*

Means and standard deviations were obtained for each of the measured variables. These results are displayed in Table 6.6 along with the results of the statistical analyses carried out on these data.

(a) Twelve-Month Diet History

(i) 12-Month Diet History of High-Emotional Participants:

Nine participants stated that they had been on one or more diets during the past 12 months. An additional 2 participants said that they were 'always dieting'. Ten participants reported never having gone a diet during the past year.

(ii) 12 Month Diet History of Low-Emotional Participants:

Only 4 participants said that they had been on 1 or more diets during the past 12 months. Seven participants reported having undertaken 1 or more diets during the past year. Only 2 said that hey were 'always dieting'. Twelve participants stated that they had not been on a diet within the last 12 months. These results are summarised in figure 6.10.

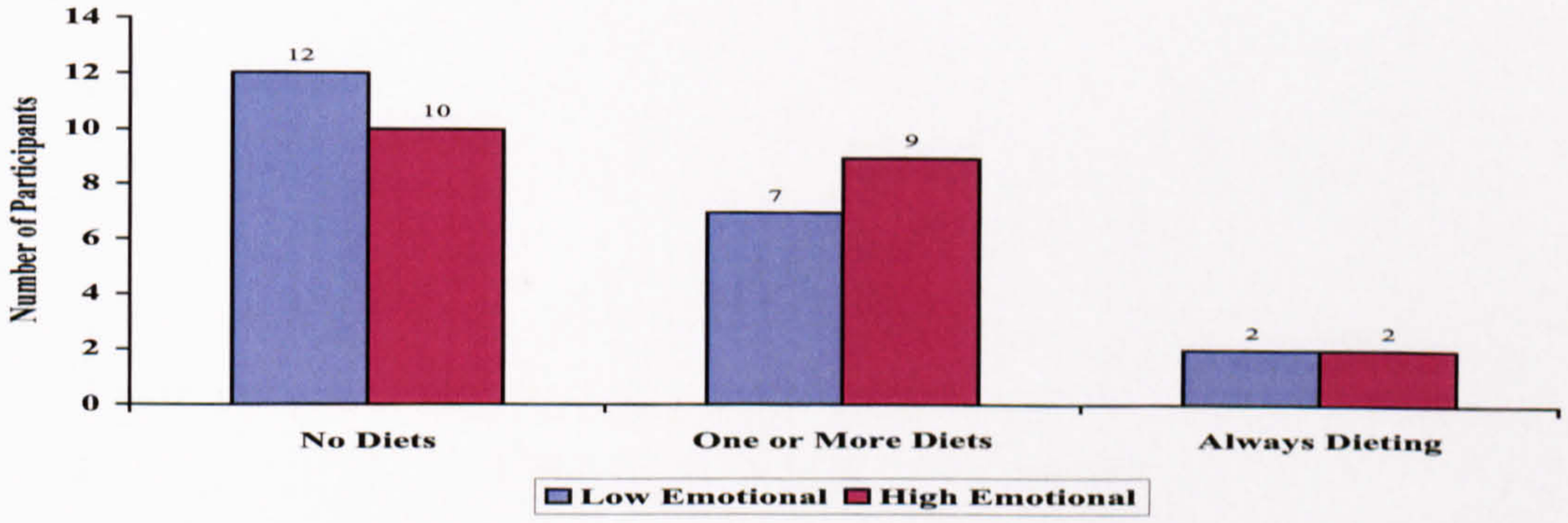

Figure 6.10 – Twelve-month diet history as a function of emotional eating status

Table 6.6 - Means (Standard Deviations) On Descriptive Measures For High- And Low-Emotional Eaters

Measure	High Emotional	Low Emotional	F Value	P value
Age (years) (log10)	20.7 (2.7)	20.7 (4.8)	< 1	> .1
BMI	22.9 (3.7)	20.8 (1.0)	6.18	0.02
Ideal weight (Kg)	57.9 (5.7)	55.0 (4.3)	2.49	0.13
WHR	0.77 (0.06)	0.77 (0.04)	< 1	> .1
Stunkard Fig – Current Appearance	4.1 (1.1)	3.4 (1.1)	Z = -2.14	0.03
Stunkard Fig – Ideal Appearance	3.0 (0.7)	2.8 (0.7)	Z = -1.10	> .1
Stunkard Fig – Discrepancy (Actual-Ideal)	1.14 (1.11)	0.62 (0.92)	Z = -1.87	0.06
Bulik Discrepancy Score (Bulik BMI – Actual BMI)	- 1.02 (1.82)	- 0.3 (2.09)	1.38	> .1
Singh – Current Size (Mean Rank)	26	17	Z = 2.47	0.013
Singh – Current shape	0.85 (0.10)	0.79 (0.09)	4.45	0.04
Singh – Ideal Size (Mean Rank)	21	22	Z < 1	> .1
Singh – Ideal Shape	0.79 (0.10)	0.75 (0.08)	1.74	> .1
Singh – Attractive Size (Mean Rank)	23	20	Z < 1	> .1
Singh – Attractive Shape	0.80 (0.10)	0.77 (0.08)	< 1	> .1
DEBQ-R	2.8 (1.0)	2.4 (1.0)	1.65	> .1
DEBQ-X	3.8 (0.5)	3.2 (0.5)	14.49	0.001
EDI-BD	10.7 (6.3)	6.6 (5.4)	5.02	0.03
Overall sense of control	4.6 (0.7)	5.4 (0.6)	16.24	0.001
Negative control	3.6 (0.8)	2.8 (1.0)	7.23	0.01
Positive control	4.7 (0.7)	5.5 (0.7)	11.97	0.001
Desire for control	4.7 (0.9)	4.7 (0.8)	< 1	NS
DASS-Depression	11.0 (9.2)	4.1 (3.4)	10.31	0.003
DASS-Anxiety	7.7 (6.0)	3.9 (4.1)	5.70	0.02
DASS-Stress	14.3 (7.2)	7.0 (6.5)	11.97	0.001
Self-Esteem	18.4 (5.2)	23.9 (4.3)	13.94	0.001
Body Checking and Avoidance	52.6 (18.1)	39.5 (10.4)	8.38	0.006
Body Shape Questionnaire	97 (34)	73 (24)	7.35	0.01
Degree of Subjective overweight (%) *	4.3 (4.1)	3.3 (4.2)	< 1	>.1
One or more diets in Past Year (No. of People Reporting)	11	9	$\chi^2 = 0.4$	> .1

*Log 10 transform

High-emotional eaters were found to have significantly larger BMIs than low-emotional eaters. However, Levene's statistic showed that the variances were not equal ($F(1,38) = 12.2$, $p < 0.001$). So, a Mann-Whitney U analyses was carried out on the data, which did

not support the difference between the groups ($Z = -1.19$, $p > 0.05$). This difference should therefore be treated with caution.

Using the Stunkard et al. (1983) and Singh (1994) silhouettes, the high-emotional eaters were found to choose significantly larger silhouettes to represent their perceived actual size and shape than low-emotional eaters. The high-emotional eaters also demonstrated higher scores on the BSQ and EDI-2 BD and reported a significantly higher level of body checking and avoidance behaviours than the low-emotional eaters. Further evidence for heightened body dissatisfaction in the high-emotional eaters came from the Stunkard discrepancy score, where they showed a trend towards a greater discrepancy than the low-emotional eaters. Conversely, no discrepancy was found using the Bulik et al. (2001) measure.

The high-emotional eaters were found to demonstrate a significantly higher level of external eating behaviour than low emotional eaters but did not differ from low-emotional eaters on their level of restraint or the number of reported diets in the past twelve months.

The high-emotional eaters reported a significantly lower overall sense of control, and positive control than low-emotional eaters. However, their sense of negative control was higher than that of the low-emotional eaters. Additionally, the high-emotional eaters reported lower levels of self-esteem and higher levels of depression, anxiety and stress than the low-emotional eaters.

6.3.2.2. Group characteristics - reaction time data

Differences in Attentional Dwell Time Between Body Type and Neutral Image Conditions as a Function of Emotional Eating Status

(a) Original and Combined Data Set

Median reaction times for each participant were obtained and means for each of the conditions calculated. Analysis revealed no significant effects of emotional eating status.

All other effects mirror those already outlined for the restraint groups.

Reaction Times – Differences in Attentional Dwell Time between the Overall Body Condition and Neutral Condition as a Function of Emotional Eating Status

(a) Original Data Set and Combined Data Set

A two-factor ANOVA with emotional eating status as the between subjects factor and

Condition type (body vs. neutral) as the within subjects factor was used to analyse this data. No interaction or main effects were found (all p values > 0.05).

6.3.2.3 Body image ratings

1. Rating of Body Size.

In order to see whether or not high- and low-emotional eaters would differentially rate the fat, thin and medium images, analyses were carried out on the ratings of size. No main or interaction effects of emotional eating were found ($p > 0.05$).

2. Rating of Body Attractiveness

In order to investigate the presence of any possible differences in attractiveness ratings both between the groups and within the body size categories, analyses were carried out on attractiveness ratings. Emotional eating status did not have any effect on the way in which images were rated ($p > 0.05$).

6.3.2.4 Error rates (combined data set only) - do error rates differ as a function of emotional eating status and body type?

Incorrect responses were analysed as a function of emotional eating status. However, this was found to have no effect on the number of errors made ($p > 0.05$).

6.4 DISCUSSION

The purpose of the current study was to explore with a more direct measure, the nature of the disengagement process in high-restrained and -emotional eaters. The findings illustrate that the relationship between disordered eating and disengagement is not a straightforward one. This relationship and its association with other measured variables will be discussed in the following sections.

6.4.1 Disengagement and disordered eating

Earlier studies in this thesis (see Chapters 4 & 5) suggested that high-restrained eaters and to a lesser extent high-emotional eaters showed a significant bias towards fat-related images. Moreover, this bias was found to be owing to a difficulty to disengage rather than the more usual finding of increased vigilance. Section 6.1.1 outlined studies with non-clinically disordered anxious individuals that pointed to them having a difficulty to disengage from threatening and fearful faces. Given these results it was predicted that the high-restrained eaters would elicit longer reaction time latencies for the fat images compared to thin and neutral images. No specific predictions were made for their reaction to medium images as it was uncertain how participants would assess this group. The prediction for fat images was not supported. Rather, no differentiation in responding was found between the two restraint groups. In fact, all of the participants were slower to

respond to targets appearing alongside thin body images compared to those following medium body images.

It should be noted that the neutral images induced more errors than the other images, although the actual number of incorrect trials was very small. In addition, only correct responses were analysed. Therefore, the actual significance of this may be deemed trivial, but nevertheless should be taken into consideration when interpreting the results as it may reflect a problem with the stimuli or category of stimuli used.

It is not too difficult to understand why the thin images may have drawn attention in a group of young women. Sackville et al. (1998) used a body and food Stroop to look for biases in restrained eaters and those with AN. They found that the women with AN showed interference for both the fat *and* thin words. They believed that this was owing to the fact that although theories posit that eating disordered individuals have a fear of fatness they are also defined by their *drive for thinness* (Bruch, 1978). As discussed in Chapter 1, thinness is a highly desired state by most women of all ages, but particularly so in young women who are subject to a raft of societal demands. This creates somewhat of a dichotomy, in that both fat and thin images could be considered important and therefore prioritised for further processing. In addition Fox et al. (2002) put forward a theory that posits that after the initial orienting period the attentional system prioritises important (for example, threatening) stimuli for extended processing. However, they believe that this system is unable to differentiate between different *levels* of threat. It is possible that the participants in the study viewed all body images as threatening or important in some way but that their attentional systems were unable to differentiate between levels of threat or importance. Alternatively, the fat and thin stimuli may have been deemed equally important and, consequently, received equal

priority for further processing. It is unclear whether or not thin stimuli are singled out for further processing because they are threatening or owing to the fact that they are considered extremely relevant and important. Buodo, Sarlo and Palomba (2002) highlight the fact that both pleasant and unpleasant stimuli when subjectively rated, are found to be more arousing and more interesting than neutral stimuli. Given all of this information it is not difficult to understand why the reaction times for fat and thin stimuli did not differ significantly.

It is more difficult to explain why the only difference found existed between thin and medium images. Looking at the rating data it is clear that participants viewed medium images as somewhat of a 'half-way house' between fat and thin, being rated as more attractive and less 'fat' than the fat images and less attractive and fatter than the thin images. However, in the rating task participants are specifically asked to scrutinise the images and make a judgement on their size and attractiveness. In the attention task, the participants' priority was to carry out a reaction time task with speed and accuracy, rather than consciously make judgements on specific attributes of the images they were viewing. Therefore, it is possible that 'unconsciously' the medium images were associated more closely and deemed more similar to the fat images than the thin images. This would go some way to explaining the lack of differentiation between the reaction times for fat and medium stimuli. Additionally, the medium images may have been considered as less interesting and arousing in comparison to the thin images. Perhaps the participants saw these images as more neutral in valence and more representative of everyday body types.

What should not be ignored however, is the possibility that the participants in the present study did not have an issue with their body image. They may not have seen the

fat images as particularly threatening and may have spent longer viewing the thin images simply because they were more attractive and pleasant to look at. Buodo et al. (2002) carried out a study that measured responses to auditory cues played at 300, 800 and 1800 ms whilst participants were viewing pleasant and unpleasant images. They found that whilst threatening images seemed to require less processing over time (evincing shorter RT latencies over a 1 second period), both neutral and pleasant images continued to engage attention over this time. They suggested that more rapid disengagement from threatening images may allow individuals to act appropriately in response to threat (e.g. run away or fight). However, they believed that it was equally possible that people just liked to attend to pleasant stimuli for longer periods of time.

In the present study, the fat images may have attracted equal attention to the thin images merely because it is relatively unusual to see larger women modelling swimwear (or any other commodity). Images of fat models are not something that are portrayed in the media, 'normal' clothing catalogues, or fashion magazines. In looking for suitable images for use in the present thesis, the author found that even online catalogues purporting to sell 'outsize' swimwear often displayed this swimwear on very thin women or on dummies rather than use larger models. Similarly, Buodo et al. found that certain emotional stimuli (e.g. blood/injury and erotic couples) engaged attention more so than others (e.g. threat and sport/adventure scenes) despite having the same subjectively rated valence. They suggested that this may be owing to the 'unexpectedness' and unfamiliarity of blood/injury and sex scenes, as these types of images were portrayed in the media with less frequency than general threatening or sport/adventure scenes.

The results showing that the neutral images elicited similar reaction times as the fat and thin body images is problematical. The category of household objects is used quite extensively in this type of research both with words and pictures (e.g. Calvo & Avero, 2005). In addition Buodo et al. (2002) used a neutral category of household objects and found arousal ratings for these to be 2.72 compared to means of 6.72 and 6.67 for sport/adventure and erotic images respectively. Moreover, Buodo et al. compared RTs on manual responses to tones sounded at one second and 4 seconds after the initial appearance of different types of stimuli. These were blood/injury, sex/erotic, sport/adventure, threat scenes (aimed guns, scenes of knife or gun attack) and household objects. At the 1 second interval, the only significant difference found was an increased RT latency when viewing blood/injury and sex scenes compared to sport and household objects. RTs for sports, adventure and threat scenes and household objects *did not differ*. This led them to conclude that the evolutionary significance of stimuli is key to the differential results between stimuli of equal values of arousal and valence. Threat scenes such as those involving immediate threat (gun or knife attack) would be processed more quickly to allow for action to be taken as soon as possible. Injury scenes do not necessarily require immediate action and so can be considered for longer periods of time. Sport/adventure scenes although they may be of personal significance do not require deep attentional processing, whereas other pleasantly rated stimuli such as those depicting sex may be considered to be of functional relevance (in evolutionary terms) and therefore receive deeper processing. Given this information it is perhaps not altogether surprising that no firm differences were found between fat, medium and neutral stimuli or between fat, neutral and thin stimuli. None represent an immediate threat to life, nor are they particularly evolutionarily significant. A further simple reason

for the lack of difference between neutral and body images is that they were considered rather novel and unusual appearing amongst what were in the main images of women. They may therefore have had a distracting effect.

It is possible that the current task was not sensitive enough a measure to capture any differential responding between high- and low-restrained (or emotional) eaters. The research in the introduction to this chapter has shown that time course is key when exploring biases in anxious populations. Leaving the images on screen for a longer period may have allowed participants to shift their attention more than once before making a response. Previous naturalistic research using eye movement studies has shown that no differences in response towards threatening images is seen until at least 1500 ms and often until after 2000 ms of viewing time. There was no way of telling in the present experiment at what point images were initially engaged and at what point attention initially shifted from this point.

The time course of attention could be investigated by manipulating the time between the appearance of the image and the appearance of the target. For example, Fox et al. (2001) and Georgiou et al. (2005) both found prolonged disengagement times for threatening images between high and low anxious participants when these images were allowed to stay on screen for 600 ms before the appearance of the target. In addition Mogg, Millar and Bradley (2000) found no biases in attention when pairs were shown for 1000 ms. They believed that at times over one second responses were influenced by more strategic processing.

The finding that there was a tendency for high-restrained eaters to exhibit slower times overall is not entirely surprising. The fact that dieting and fasting often lead to increased preoccupation with food and eating has been discussed in section 5.4.1. and

may well have played a part in slowing down the high-restrained eaters in this study. Certainly, they reported having been on considerably more diets than the low-restrained eaters over the past year, and the fact that they scored highly on the restraint scale indicates that they were attempting to restrain their food intake.

The addition of the 'new' fat and thin images did not appear to have an effect on the overall reaction time results. The pattern was the same whether or not the new images were included in the analyses. Participants in Chapter 3 rated the 'new' thin images as thinner and less attractive than the majority of other thin images. Similarly, the overall ratings for the two sets of thin images in the present study appeared to mirror this result. However, the differences were apparently too small to elicit an effect on the reaction times.

6.4.2 Concern for body shape - failure to reach clinical levels

The questionnaire data revealed that high-restrained eaters had higher level of body dissatisfaction than low-restrained eaters, which is unsurprising. They also evidenced greater levels of body checking and concern for weight and shape. Despite this they did not have lower levels of self-esteem. This suggests that they were not basing their self-esteem on the way that they looked. This could be advantageous and may well be acting as a protective mechanism, ameliorating their heightened body-image concerns and preventing them from developing more serious manifestations of eating disordered behaviour. However, if BCQ and BSQ scores for high-restrained eaters are compared to the clinical and non-clinical groups used in the original validation studies for these questionnaires, some interesting facts emerge. Firstly, BSQ scores for high-restrained and high-emotional eaters in the present study do not reach the levels achieved by either those with BN or probable BN cases, and are more in line with the non-clinical

'concerned' group. Therefore their *level* of concern for body shape can said to be not one of *clinical* concern. Similarly, scores on the BCQ also fail to reach those of 'clinical' proportions. Both high-restrained and high-emotional eaters scored similar to those of the non-dieting and less concerned groups used in the original study. Although, it is acknowledged that the questionnaire was adapted for use in the present study, scores from the original study group still provide useful and valid comparisons. This general lack of 'clinical' level of concern for body weight and shape may go some way in explaining the lack of apparent bias for body images in the present study. Interestingly, the high-restrained participants also scored higher on measures of emotional eating (the mean score for the group was above the median score for all participants, so this group would have been considered high in emotional eating as well as high in restraint). This suggests that they may be using food as a way of alleviating negative mood states. The high-restrained groups did report higher levels of depression over the week prior to testing. Their restrained eating patterns then may have been a way of counteracting 'emotional' splurges, rather than a profound reaction to their body shape/weight per se. Similarly, restrained eating in some individuals is thought to leave them vulnerable to disinhibition of eating (see section 1.3.5), perhaps making it more likely that they would use food as an emotional crutch.

Even if their restrained eating was partially driven by low body dissatisfaction and weight and shape concern, it is possible that they did not perceive the study images to be representative of *themselves*. Seeing themselves at different weights may have had much more of a profound effect on their reaction times as a function of body size. It is possible to distance oneself from others and their state, but less easy when faced with a

'real life' image of what could happen to the self. This may have the propensity to elicit the fear required to see differential responding in high and low restrained eaters.

The high-emotional eaters scored more highly on measures of body dissatisfaction, weight and shape concern and body checking and avoidance than low-emotional eaters. This shows that body image was of concern to this group but as discussed earlier in this section, these scores did not reach clinical levels of concern. In addition, high-emotional eaters had a lower sense of overall control, and positive control, than low-emotional eaters. However, their levels of negative control were higher. This is generally perceived as a maladaptive pattern. Interestingly, however, despite the low levels of control, they did not have a higher scores on desire for control. It is possible that they felt that higher levels of control were unachievable and therefore to strive for more control was useless. Both high- and low-emotional eaters reported dieting during the past year, and they did not differ in their levels of restraint. However, the high-emotional eaters did show higher levels of external eating behaviour, implying an increased propensity to eat in response to outside influences such as the smell of food and the eating behaviour of others around them. This coupled with their emotional eating behaviour suggests that their eating may be out of control or perceived by them to be so. This could be responsible in part for their scores on the control scale. Previous research has highlighted the association between emotional and external eating (Wardle, 1987), and between emotional eating and weight and shape concern (Eldredge & Agras, 1994). In addition, this pattern of behaviour is often associated with binge eating disorder and BN (Lindeman & Stark, 2001; Eldredge & Agras, and Wardle). However, although not reported in the results section, very few participants actually endorsed

items on the BSQ that are generally associated with bulimic practices such as vomiting and laxative abuse, and binge eating was not specifically assessed.

The results for the body image ratings mirror those of Chapters 1 and 5. In addition, it was reassuring to see that medium sized bodies were rated as mid-way in size and attractiveness to thin and fat images.

In conclusion, this study raised issues regarding the time course of attention and also further extended our knowledge of patterns of eating behaviour in restrained and emotional eaters. As the time-course of attention may play a major role in the manifestation of attentional biases it was considered important to investigate this further, therefore the next study looked to investigate this more closely by varying the time between the appearance of the image and the appearance of the target.

CHAPTER 7

Leaving a 'gap' between stimulus and target: examination of the duration of attentional dwell time.

The previous study found that all participants, regardless of their restrained or emotional eating status, showed slowed reaction times in response to targets appearing alongside thin images compared to those accompanying medium images. No other significant differences between image types were found. It was suggested that the absence of a definite bias by high-restrained eaters might have been due to the length of time participants were exposed to the images. The long exposure time in the previous study may have made it possible for participants to have initially engaged on threat-related stimuli and then to seek to avoid the threat.

The research outlined in section 6.1.1 pointed to the instability of bias results even in the relatively extensively researched area of anxiety. However, the point at which attention is 'measured' has varied considerably across studies. The time at which responses are recorded are thought to play a key role in the accurate detection of such biases. In order to learn more about the time course of attentional biases in the area of eating-related research, the present study aimed to manipulate the disengage component of attention by altering the SOA (time between the onset of the stimulus and the onset of the target). This is typically the method used by attention researchers when looking at the time course of attention (e.g. Fox et al. 2002; Yiend & Mathews, 2001, section 6.1.1). In addition, manipulating SOA allowed the time between the offset of the stimulus and the onset of the target (the 'gap' time) to be controlled. The following section will outline in more detail the background and rationale to the study.

7.1 BACKGROUND AND RATIONALE

It is well established that the introduction of a temporal 'gap' between the offset of a target or stimulus and the onset of a cue (or target) reduces the mean latency of saccades (eye movements; e.g. van der Geest et al., 2001; Pratt & Nghiem, 2000; Farroni, Simion, Umiltà & Dalla Barba, 1999; Danckert & Maruff, 1997). This is known as the 'gap effect' (Danckert & Maruff). When a target appears on screen soon after the appearance of a stimulus, and that stimulus then remains on the screen, it is likely that initially at least, attention will still be engaged on the stimulus. During this time the saccade system is inhibited (Farroni et al.). Introducing a gap between stimulus offset and target onset releases the inhibitory effect in the saccade system and allows the disengagement of attention to occur before the target appears (Danckert & Maruff; Farroni et al.). Where stimulus offset and target onset are virtually simultaneous "all aspects of saccade preparation must occur after the target has appeared" (Danckert & Maruff; p. 501). This of course, results in longer RTs.

The time course of attention is an area that has recently begun to engender much interest (Perry & Hodges, 2003). One aspect of this area of attention is the measurement of the length of time attention remains engaged at a stimulus. Evidence has accrued of an interference effect when a target that requires a participant response rapidly follows a previously attended stimulus. Perry and Hodges state;

> As a result of limited attentional processing capacity the 'cost' of attending to one visual stimulus may lead to a temporary functional blindness to other unattended stimuli (p. 221).

Perry and Hodges (2003) maintain that the cost of attending to an initial stimulus may interfere with the processing of a second stimulus for time periods up to *500* ms. Other studies that have attempted to measure the time that a stimulus occupies attentional

capacity quote ranges from 100-500 ms (e.g. Duncan, Ward & Shapiro, 1994). This phenomenon is known as the attentional blink (Perry & Hodges).

Fox et al. (2001) speculate that a short-term increase in attentional dwell time (i.e. the time spent focusing on a particular stimulus) on threatening stimuli may "flow through the cognitive system, escalating into constant rumination and worry" (p. 698). This in turn may lead to an increase in anxiety states. It is therefore possible that if a vulnerable individual becomes 'fixated' on a threatening stimulus they will process it more deeply than they would neutral stimuli, and that they will continue to engage the location of the stimulus even after it had disappeared from the screen. In other words, the individual may continue to dwell and ruminate on the stimulus (and what it means for them), thereby hampering their ability to continue with any ongoing cognitive task. This is particularly so if the stimulus causes an increase in anxiety.

The length of disengagement in non-clinically eating disordered individuals is however unknown. Therefore, the present study aimed to manipulate the 'gap' between the offset of the central stimulus and the onset of the target in addition to the more usual measurement of SOA.

7.1.1 Modifications and predictions

The image presentation time in the present study was reduced to 200 ms. As mentioned in section 6.1, many researchers (e.g. Fox et al., 2001; Koster, et al., 2005) believe that presentation times of 500 ms are too long as more than one shift of attention can take place over this time period.

The amount of attentional control exhibited by individuals is also thought to play a role in the ability to become distracted by certain stimuli (Derryberry & Reed, 2002). Therefore, a measure of attentional control is included in the present study in order to

see whether or not this differs in high restrained or emotional eating patterns. The concept will be further explored in section 7.2.2.1.

In line with the results found in Chapter 4, and taking into consideration the evidence cited in Chapter 6 and the introduction of the current chapter, it was thought that high-restrained eaters may be more likely to dwell on threatening images such as fat and possibly thin body shapes. It would therefore be predicted that they would take longer to disengage from fat-related images compared to neutral images. This may be more likely when the SOA/gap time was relatively short (200-500 ms). Because at longer SOA/gap times (1300/1500 ms) avoidance strategies may be initiated, it was predicted that high-restrained participants would have already disengaged the threat stimulus by the time the target appeared, resulting in reduced reaction time latencies. No specific effects were expected for the high-emotional eaters, as no firm results had been elicited during the visual probe task.

7.2 METHOD

7.2.1 Participants

Forty-six participants took part in the present study. All those who took part, were drawn either from the food and drink research database or the experimental hours scheme. See sections 4.2.1 and 5.2.1 respectively for details pertaining to these schemes.

The mean age of the participants was 19.8 years (SD = 2.36; Age range = 18-32 years).

The majority (78.3%) of the participants described themselves as 'White British', with 10.9% stating that they were from 'other white backgrounds'. A further 6.5% said that they were from 'mixed white and Asian' or 'other Asian' backgrounds. The remaining 4.4% were from other ethnic backgrounds.

All participants had normal, or corrected to normal vision. Participation was voluntary and complete anonymity was assured by assigning each of the participants their own study code. All participants provided informed consent before commencing the study procedures.

7.2.2 Measures

7.2.2.1 Self-Report Questionnaire Measures

All questionnaires used in this study were identical to those used in Chapter 6 apart from the addition of the Attentional Control Scale (ACS; Derryberry and Reed, 2002).

Attentional Control Scale (ACS; Derryberry & Reed, 2002)

Derryberry and Reed (2002) describe attentional control as "a general capacity to control attention in relation to positive as well as negative reactions" (p 226). The 20-item ACS serves the purpose of assessing "individual differences in attentional skills related to voluntary executive functions" (Derryberry, 2002; p. 106). Derryberry and Reed developed the present scale by combining the measures of attentional focusing and attentional shifting originally devised by Derryberry and Rothbart (1988). Both of these measures are thought to relate to functioning of the anterior attentional system. This system plays a regulatory role over more automatic or involuntary processes. If the system is working effectively, the individual may be able to successfully divert attention away from threatening stimuli and towards a more comforting source, thereby relieving anxiety.

These two scales along with a variety of other scales purported to measure different constructs of human temperament. On the basis of current theory, Derryberry and Rothbart (1988) initially decomposed human temperament into central constructs,

which were themselves broken into smaller sub constructs. Attentional focusing (AF), attentional shifting (AS), inhibitory control and behavioural activation composed the main construct of self-regulation. A 300-item questionnaire was developed in order to measure each of the 19 sub constructs of human temperament. A total of 231 undergraduate students completed the questionnaire. In order to assess test-retest reliability, a subset of 30 participants completed the test again 2 weeks subsequent to the initial test.

The items measuring AF and AS were found to show high internal consistency ($\alpha = 0.8$ and 0.65 respectively). Test-retest reliability was also found to be high for these sub constructs (AF = 0.73 and AS = 0.84, $p = 0.01$). Interestingly, when each of the sub constructs was correlated with one another, the authors found AF and AS to be fairly highly correlated (0.54). Owing to this finding, Derryberry and Rothbart (1988) believed that, when combined, these sub constructs might form a measure of general attentional control. Derryberry and Reed carried out factor analyses on a scale combining the AF and AS (the ACS) and found it to educe three main modes of attentional control: firstly, flexibility of thought control; secondly, the ability to switch attention from task to task; and finally, the ability to direct one's perceptual attention (Derryberry, 2002). In addition, Derryberry and Reed (2002) report that they have found the scale to have a high internal consistency ($\alpha = 0.88$).

Participants are asked to circle one of 4 possible responses from 1 (almost never) to 4 (always) in response to statements relating to their perceived level of attentional control in different situations. Examples of items that ask about the 3 main sub factors of the scale are as follows. (a) Attentional focusing: *My concentration is good even if there is music in the room around me.* (b) Shifting attention: *It's easy for me to read or write*

whilst I'm also taking on the phone. (c) Flexibility of thought: *I can become interested in a new topic very quickly when I need to.* A total attentional control score is obtained by totalling the scores for all of the items. A higher score indicates a higher level of attentional control. Derryberry and Reed (2002) carried out a spatial orienting task where peripheral cues could draw attention either towards a safe (positive feedback received) or threatening location (negative feedback received). The participants then had to respond to a target that could appear in either the cued or uncued position. When the target appeared 250 ms following the cue offset, anxious participants high and low in attentional control were slower to disengage from the negative cue. However, at 500 ms interval, only the anxious participants who were also low in attentional control exhibited this effect. Those higher in attentional control were more able to redirect attention to a safer location. It should be noted that participants in Derryberry and Reed study were split in to high and low attentional control by virtue of a median split of 52.5 on the ACS.

Given this information, it was thought appropriate to use the scale in the current study in order to investigate the association between attentional control and difficulty to disengage from threatening images.

7.2.2.2 Disengagement task

The Stimuli

All of the images used in this study were identical to those used in Study 4 (see section 6.2.2.2), with the omission of the 'medium' images. These were omitted in this case in order to limit the number of total trials in the task. This was thought appropriate in this case as the main aim of the present study was to further explore the apparent disengagement difficulty found in study 1, where only 'fat' and 'thin' images were used.

All information regarding apparatus and design is identical to that detailed in section 6.2.2.2

Presentation and Timing of Stimuli Presentation

The stimuli were presented over 4 screens as follows:

Screen 1

This screen was identical to that outlined in section 6.2.2.2.

Screen 2

The two flanking boxes remained in the same position as those in screen 1. However, now the central fixation cross was replaced by one of the test stimuli. This screen remained for only 200 ms and was then immediately replaced by screen 3.

Screen 3

This screen was identical to screen 1. The length of time between the appearance of the stimuli and the appearance of the target (gap time) was varied by showing screen 3 for 0, 300, or 1300ms (these times represent the 'gap' time). Combined with screen 2, this gave SOAs of 200, 500 and 1500ms respectively.

Screen 4

This screen was identical to that of screen 3 in section 6.2.2.2. A figural representation of the task can be observed in figure 7.1.

Randomisation of Stimuli

Full randomisation of all of the images would have resulted in 12 possible presentations for each stimulus (i.e. for the target to appear on each side of the screen, for each orientation for each possible duration with equal probability). It was considered that this would have lead to too great a number of trials per participant. Therefore, partial

randomisation was carried out as illustrated in table 7.1. When scheduling the presentation details within e-prime, the following pattern was adopted. For the first image written into the programme (e.g. image 1), the target 'T' was upright on the right hand side of the screen and inverse on the left for each of the time durations. For image 2, the reverse was true. This alternating pattern reoccurred until all stimuli had been programmed. Using this method of presentation, the total number of trials summed to 174 (29 images x 6 presentations) for the 'thin' condition and 156 (26 images x 6 presentations) for the 'fat' condition. The number of trials in the neutral condition totalled 240 (40 images x 6 presentations). In total each participant saw 570 trials. The order of presentation of the trials was fully randomised by e-prime. The task was divided into 3 blocks, in between which the participants were instructed to break before carrying on to the next block. Each block contained 190 trials. Any of the trials could appear in any block with equal probability.

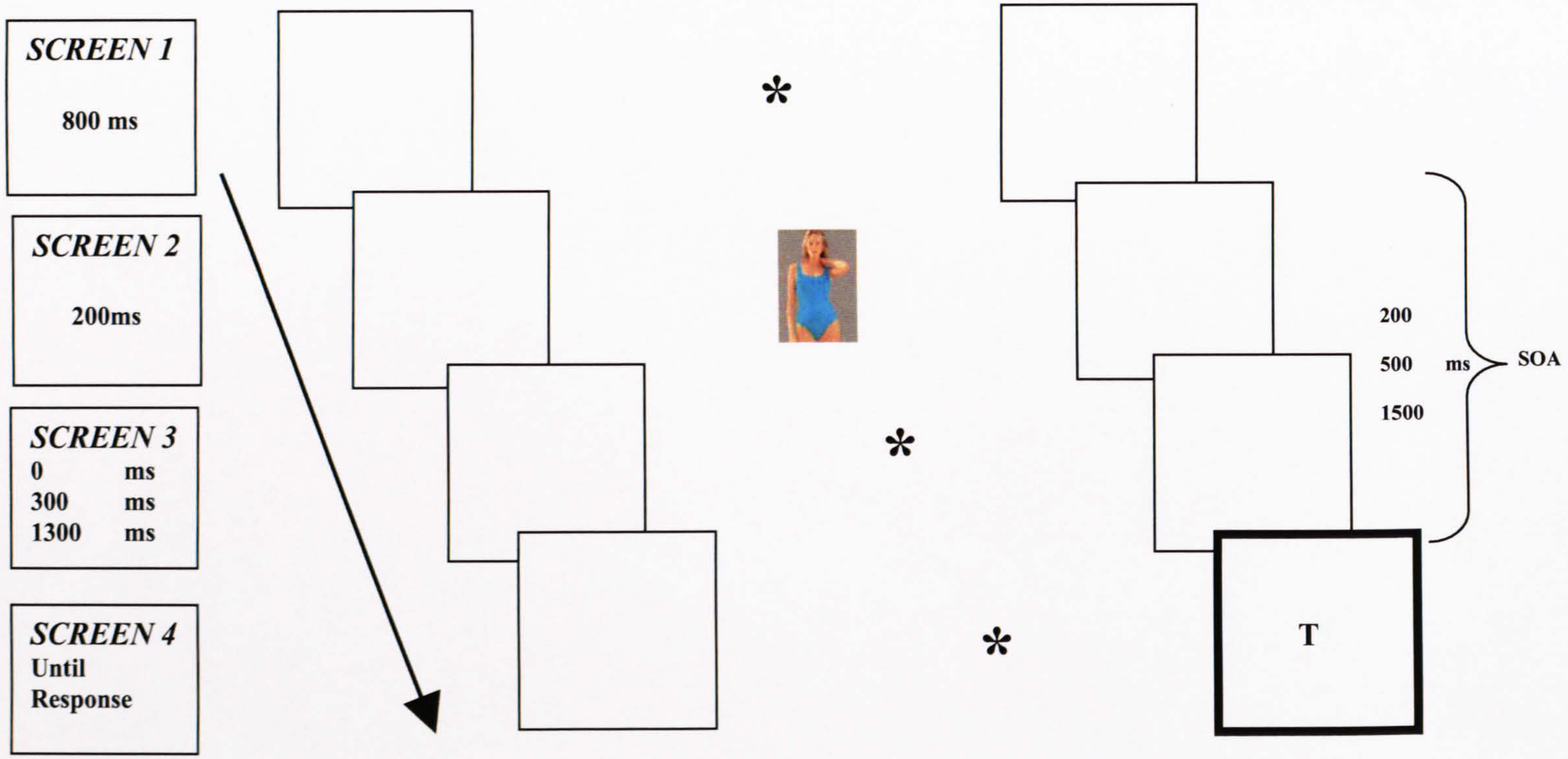

Figure 7.1 - Schematic representation of the sequence of screens in the gap task

Table 7.1 – All Possible Screen Positions for Each of the Test Stimuli

Box 1	Test Stimuli	Box 2	'T' Position (within 5 pixel box)	SOA (Gap Time) ms
1 Pixel Box	Image 1	5 Pixel Box	Upright	200 (0)
5 Pixel Box	Image 1	1 Pixel Box	Inverse	200 (0)
1 Pixel Box	Image 1	5 Pixel Box	Upright	500 (300)
5 Pixel Box	Image 1	1 Pixel Box	Inverse	500 (300)
1 Pixel Box	Image 1	5 Pixel Box	Upright	1500 (1300)
5 Pixel Box	Image 1	1 Pixel Box	Inverse	1500 (1300)
1 Pixel Box	Image 2	5 Pixel Box	Inverse	200 (0)
5 Pixel Box	Image 2	1 Pixel Box	Upright	200 (0)
1 Pixel Box	Image 2	5 Pixel Box	Inverse	500 (300)
5 Pixel Box	Image 2	1 Pixel Box	Upright	500 (300)
1 Pixel Box	Image 2	5 Pixel Box	Inverse	1500 (1300)
5 Pixel Box	Image 2	1 Pixel Box	Upright	1500 (1300)

NB: The target 'T' always appears in the 5-pixel box

7.2.2.3 Body image ratings task

All details pertaining to this task were identical to those outlined in section 6.2.2.3, with the exception of the medium sized images, which were excluded from this study.

Procedure

The basic procedure for this task is identical to that outlined in section 6.2.2.3. The instructions differed slightly in that participants were informed that sometimes there would be a delay between the appearance of the picture and the appearance of the 'T'. The information sheet, consent form, debriefing sheet and contacts list are essentially the same as those used in the study outlined in Chapter 6.

7.2.3 Data analysis

(a) Questionnaire data

Forty-six women took part in the present study. They were classified into either high- or low-restrained or emotional eaters using a median split of their total scores on the restraint or emotional eating scale of the DEBQ (van Strien et al., 1986). Low-restrained eaters were defined as those with a score of 2.8 and below, those with a score of 2.8 and above were classified as high-restrained eaters. Similarly, low-emotional eaters were those with a score of below 3.35, with high-emotional eaters scoring 3.35 and above. Tables 7.2 and 7.3 show means and standard deviations for each of the resultant groups.

Table 7.2 – Mean (Standard Deviation) Restraint Scores For High And Low Restrained Eaters

	Number	Mean
High Restrained	25	3.64 (0.59)
Low Restrained	21	2.01 (0.48)

Table 7.3 – Mean (Standard Deviation) Restraint Scores For High And Low Emotional Eaters

	Number	Mean
High Emotional	23	3.88 (0.45)
Low Emotional	23	2.68 (0.53)

As in previous sections, if participants had failed to answer 1 item of a particular subscale of a questionnaire, the scores of that subscale were summed and the mean derived by dividing by the number of items actually answered. Where more than one item was missed, no score was recorded for that sub scale of the questionnaire.

A series of univariate ANOVAs or Mann-Whitney U tests were carried out in order to investigate any possible differences between high and low restrained eaters and high and low emotional eaters on any of the measured variables.

(b) Reaction Time Data

Only correct responses to 'T' orientation were used in the final analyses. All incorrect responses were excluded. This resulted in a loss of 6.08% (or 1560 trials out of a possible 25,650 – this does not include practice trials).

(c) All Data

Data Transformation

See section 4.2.3 for methods applied to test and correct for data abnormalities.

7.3 RESULTS

7.3.1 Restraint Status

7.3.1.1 Group Characteristics – Questionnaire Variables

Means and standard deviations were obtained for each of the measured questionnaire variables. These can be observed in Table 7.4.

(a) Diet History over the Past 12 Months

In accordance with the previous studies, the 6 diet categories were collapsed into just 2:

(a) those who had NOT been on a diet during the last 12 months.

(b) those who had been on 1 or more diets. This category also included those who claimed that they were 'always dieting'.

(i) Twelve-Month Diet History of Low Restrained Participants:

Fifteen of the low restrained participants stated that they had not been on a diet during the past 12 months. Six participants claimed that they had been on 1 or more diets in the last year. None of the low restrained eaters claimed that they were 'always dieting'.

Table 7.4 – Means (Standard Deviations) on Descriptive Measures For High- and Low-Restrained Participants

Measure	High Restrained	Low Restrained	F Value	P value
Age (years) (outliers removed	19.4 (1.0)	19.4 (1.0)	< 1	> .1
BMI	22.1 (2.1)	21.4 (1.6)	1.5	> .1
Ideal weight (Kg)	56.5 (4.9)	54.1 (3.8)	2.52	0.1
WHR	0.77 (0.06)	0.75 (0.06)	1.6	> .1
Stunkard Fig – Current Appearance	4.1 (1.3)	3.2 (0.8)	Z = - 2.86	0.004
Stunkard Fig – Ideal Appearance	2.7 (0.7)	2.7 (0.7)	Z = < 1	> .1
Stunkard Fig – Discrepancy (Actual-Ideal)	1.31 (1.04)	0.52 (0.75)	Z = - 3.00	0.003
Bulik Discrepancy Score BMI – Actual BMI	- 2.16 (3.35)	- 1.14 (1.24)	1.74	> .1
Singh – Current Size (Mean Rank)	27	19	Z = 2.36	0.018
Singh – Current shape	0.83 (0.11)	0.80 (0.10)	< 1	> .1
Singh – Ideal Size (Mean Rank)	25	22	Z < 1	> .1
Singh – Ideal Shape	0.77 (0.09)	0.76 (0.09)	< 1	> .1
Singh – Attractive Size (Mean Rank)	24	23	Z < 1	> .1
Singh – Attractive Shape	0.75 (0.08)	0.79 (0.11)	2.26	> .1
DEBQ-E	3.4 (0.8)	3.1 (0.7)	1.97	> .1
DEBQ-X	4.4 (0.5)	4.3 (0.4)	0.73	> .1
EDI-BD	12.5 (7.2)	5.3 (5.3)	14.40	0.0001
Overall sense of control	4.5 (0.9)	5.1 (0.5)	8.95	0.005
Negative control	3.6 (1.0)	2.8 (0.5)	9.96	0.003
Positive control	4.5 (0.9)	5.0 (0.7)	4.96	0.049
Desire for control	4.9 (0.8)	4.6 (0.9)	1.58	> .1
Attentional Control	46.0 (8.2)	48.7 (6.6)	1.34	> .1
DASS-Depression	14.2 (10.3)	8.0 (7.1)	5.29	0.026
DASS-Anxiety (outlier removed)	9.36 (8.6)	4.63 (3.3)	5.09	0.029
DASS-Stress	18.9 (10.7)	10.9 (8.1)	7.67	0.008
Self-Esteem	15.4 (2.5)	14.6 (3.3)	< 1	> .1
Body Checking and Avoidance	58.1 (16.2)	39.7 (10.2)	20.25	0.0001
Body Shape Questionnaire	115 (33)	71 (17)	30.75	0.0001
Degree of Subjective overweight (%)	3.8 (2.7)	2.0 (2.2)	4.36	0.045
One or more diets in Past Year (No. of People Reporting)	21	6	χ^2 = 14.46	0.0001

(ii) Twelve-Month Diet History of High Restrained Participants:

Only 4 of the high-restrained participants stated that they had not been on a diet during the past year. In comparison, 21 of the participants claimed that they had undertaken 1 or more

diets. Of this number, 4 admitted to have dieted 4 or more times and 6 claimed that they were always dieting. Results for high and low restrained eaters are displayed in figure 7.2.

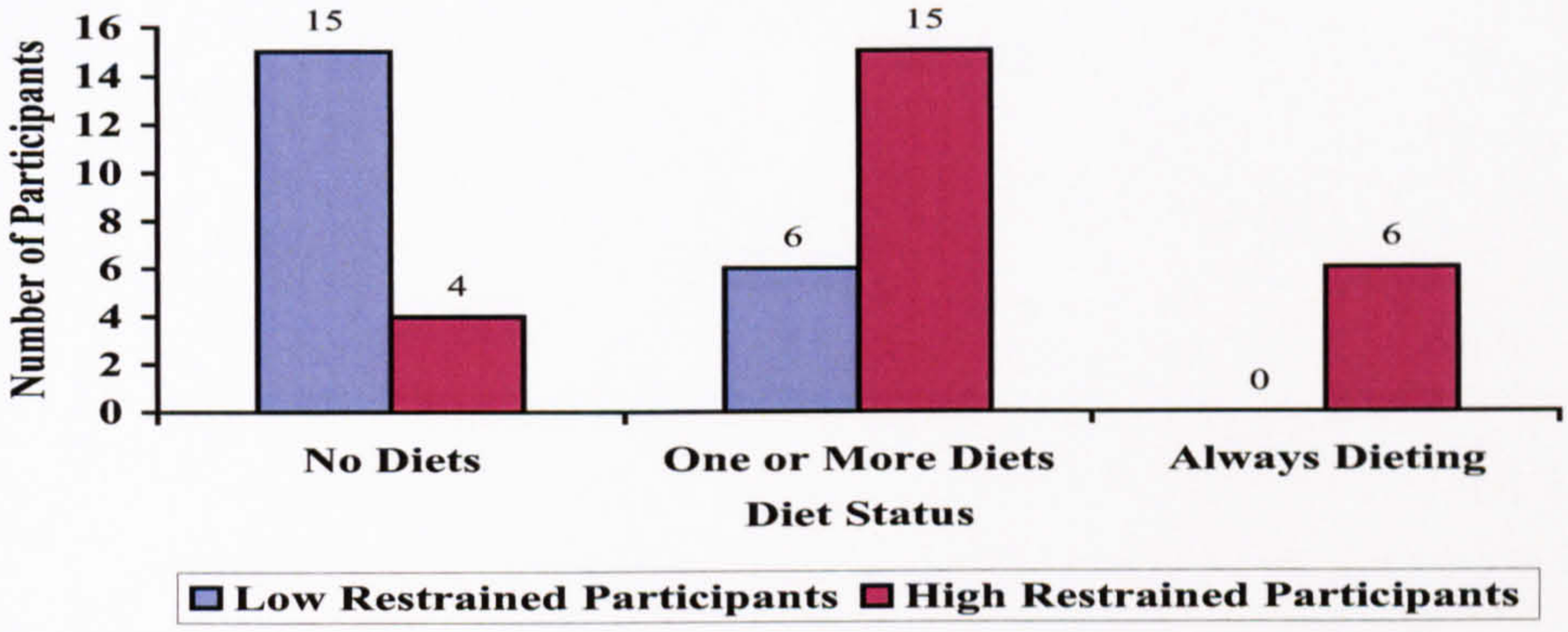

Figure 7.2 - Twelve month diet history in low and high-restrained participants

The high-restrained eaters demonstrated significantly higher levels of body dissatisfaction than low-restrained eaters as evidenced by higher scores on the EDI-2 BD, BSQ, Stunkard et al. (1983) and Bulik et al. (2001) discrepancy measures and Tiggemann's (1994) measure of perceived percentage overweight. In addition, using the Stunkard et al. and Singh (1994) silhouettes, the high-restrained eaters chose significantly larger figures to represent their current size than did low-restrained eaters. They were also found to exhibit a significantly greater number of body checking and avoidance behaviours and a greater frequency of dieting behaviour over the past year, than the low-restrained eaters.

The two groups also differed significantly on their reported levels of overall sense of control, positive control and negative control, with the high-restrained groups showing the more maladaptive pattern. Interestingly, the groups did not differ on their levels of attentional control.

The high-restrained participants were significantly more depressed than the low-restrained participants. However, the samples were found to have unequal variances (as

evidenced by a significant Levene's statistic (F (1, 43) = 4.32, p = 0.04). Therefore, a Mann-Whitney U analysis was carried out. This supported the significant difference between the two groups (Z = -2.12, p = 0.034). Similarly, the high-restrained participants reported significantly higher levels of anxiety than the low-restrained group. Again, Levene's statistic was found to be significant (F (1,42) = 15.00, p = 0.0001). A Mann-Whitney U analysis did not support the significant difference illustrated by the ANOVA (Z = -1.58, p > 0.05). Finally, levels of stress were found to be significantly higher for the high-restrained group.

7.3.1.2 Group characteristics - reaction time data

Differences in Reaction Times as a Function of Restraint Status, Image Type and SOA (Gap Time)

Median reaction times for each participant for each image type for each of the SOA (gap) times were calculated. An overall mean was then calculated for each of these conditions. As high-restrained eaters obtained higher scores on all DASS subscales there was a concern that this may impact on the overall reaction times. However, when overall RTs for the high-restrained eaters were correlated against each of the DASS subscales, no significant associations were revealed (largest r = 0.042). Therefore, it was not considered necessary to control for the effect of these variables, and a regular 3-factor ANOVA was carried out in order to assess the relationship between restraint, SOA and body type. Means and key results are illustrated in figure 7.3. A main effect of SOA was found. A trend towards an interaction between SOA and restraint status was also found (F (2, 82) = 2.93, p = 0.07; Greenhouse-Geisser corrected values). Bonferroni comparisons were carried out in order to further explore the differences between the 3 levels of SOA. It was found that RTs for the 200 ms gap time condition were significantly slower than those for the 500 and 1500 ms

SOA conditions. RTs for the 1500 condition were found to show a trend towards being slower than those in the 500 ms condition.

As the interaction between SOA and restraint status showed a trend towards significance it was considered an informative exercise to further explore the nature of the interaction. Therefore, reaction times were looked at separately each of the SOAs. No significant differences were found between restraint groups for either the 200 or 500 ms SOAs. However, when RTs for high- and low-restrained eaters are compared in the 1500 ms SOA, there is a non-significant trend towards high-restrained eaters showing reduced RT latencies compared to low-restrained eaters (628.2 vs. 649.4, p = 0.157). This suggests that at this time period the high-restrained eaters were faster to disengage from all images than the low restrained eaters.

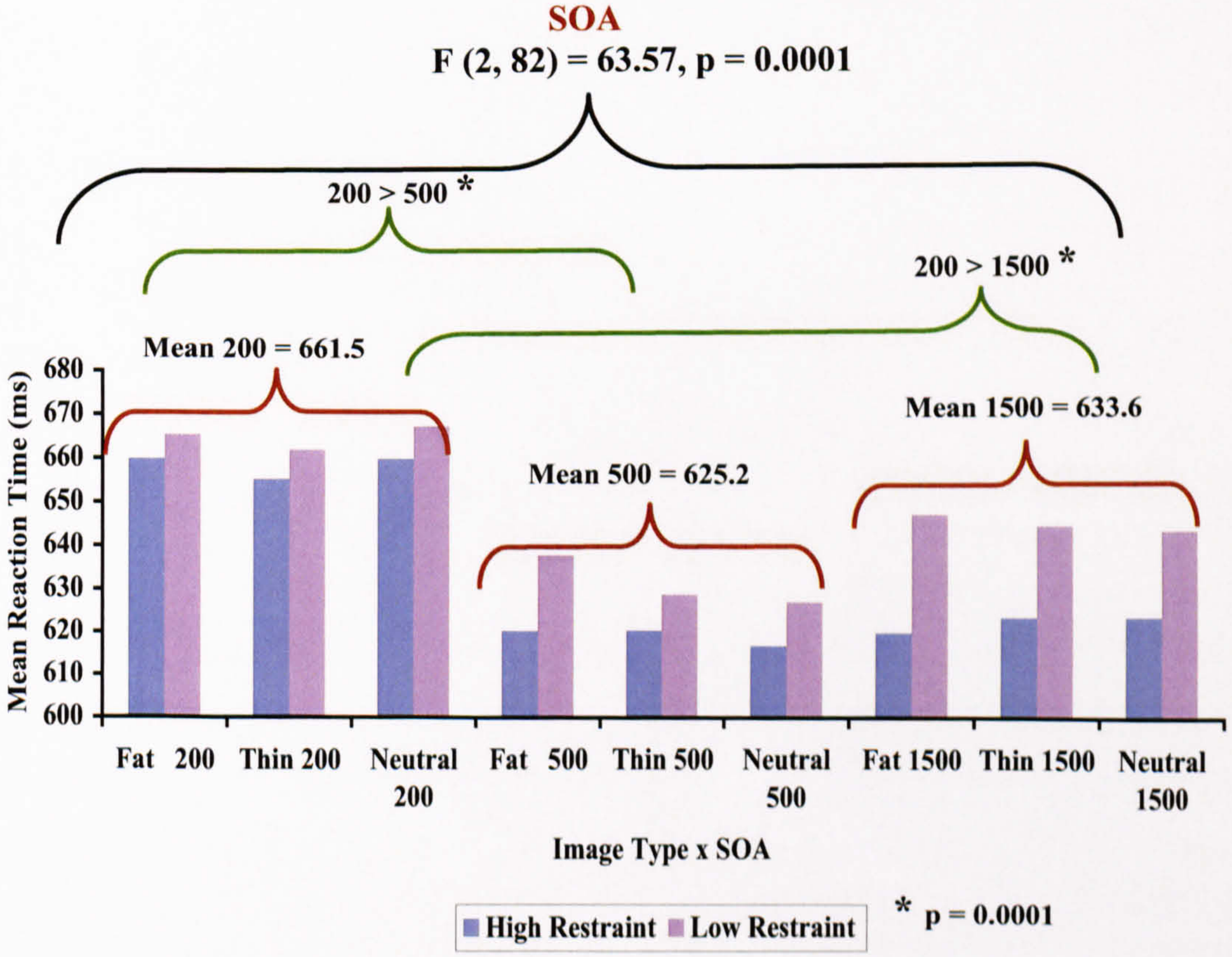

Figure 7.3 – The effect of restraint status, image type and SOA on reaction time

Differences in Reaction Times as a Function of Restraint Status, Image Type (Overall Body vs. Neutral) and SOA (Gap Time)

As in section 6.3.1.2, the two body image categories were collapsed into one named

'Body'. Analysis revealed no overall effect of 'body' ($p > 0.05$).

7.3.1.3 Body image ratings

1. Rating of Body Size.

In order to test the utility of the fat and thin groups and to see whether ratings of the images differed as a function of restraint, mean ratings for the fat and thin were calculated. An overall effect of body type was found ($F(1, 42) = 2165.01$, $p = 0.0001$; Greenhouse-Geisser corrected value), with the fat images being rated as significantly fatter than the thin images (5.5 vs. 2.4). However, no effect of restraint was found ($p > 0.05$).

2. Ratings of Body Attractiveness

Analyses were carried out in order to see whether ratings of attractiveness of the images differed as a function of restraint. Only an overall effect of body type was found ($F(1, 43) = 1120.97$. $p = 0.0001$), with the fat images being rated as significantly less attractive than the thin images (5.6 vs. 2.1).

7.3.1.4 Error rates - do error rates differ as a function of restraint status and body type?

In order to see whether or not error rates differed between restraint groups or image types a two factor mixed ANOVA with restraint status as the between groups variable and image type (fat vs. neutral vs. thin) was carried out. This showed only a significant main effect of image type ($F(2, 84) = 107.08$, $p = 0.0001$). A series of multiple comparisons with Bonferroni comparison were carried out. These showed that more errors were made in the

neutral condition compared with both the fat (18.1 vs. 8.2) and thin (18.1 vs. 8.7) conditions.

7.3.2 Emotional eating status

7.3.2.1 *Group Characteristics – Questionnaire variables*

Means and standard deviations were obtained for each of the measured questionnaire variables. These can be observed in Table 7.5

(a) Diet History over the Past 12 Months

The data were collapsed as described in section 7.3.1.1.

(i) 12 month Diet History of High Emotional Participants:

Thirteen highly restrained participants claimed that they had been on 1 or more diets during the past 12 months. Four said that they were 'always dieting'. Only 6 reported that they had not been on a diet.

(ii) 12 Month Diet History of Low Emotional Participants:

Eight of the low emotional participants stated that they had been on more than 1 diet in the last year. Two admitted that they were 'always dieting'. Thirteen claimed that they had not been on a diet during the past 12 months. These results are illustrated in figure 7.4.

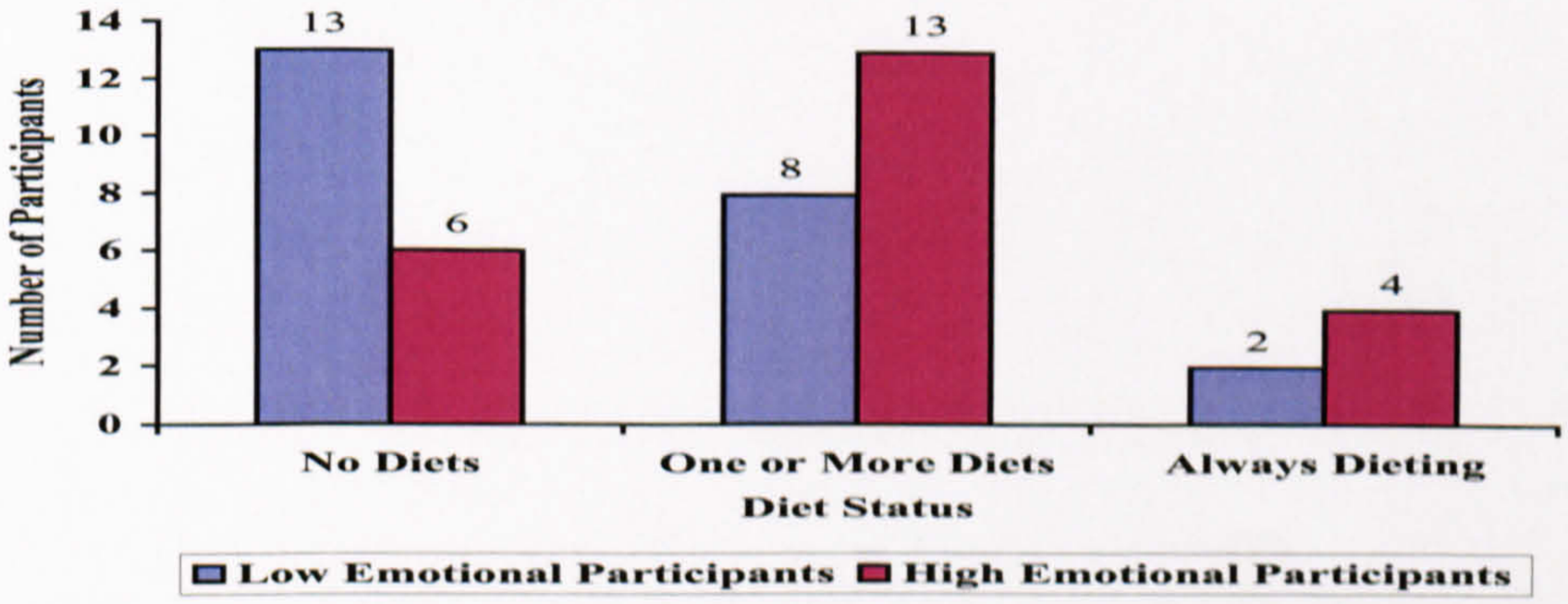

Figure 7.4 – Twelve-month diet history as a function of emotional eating status

Table 7.5 – Means (Standard Deviations) On Descriptive Measures For High And Low Emotional Eaters

Measure	High Emotional	Low Emotional	F Value	P value
Age (years) (outliers removed	19. 4 (1.5)	19.4 (0.9)	< 1	> .1
BMI	21.4 (1.9)	22.2 (1.9)	1.83	> .1
Ideal weight (Kg)	54.7 (5.0)	56.4 (3.9)	1.3	> .1
WHR	0.77 (0.05)	0.75 (0.06)	< 1	> .1
Stunkard Fig – Current Appearance	3.78 (1.35)	3.61 (1.03)	Z = < 1	> .1
Stunkard Fig – Ideal Appearance	2.54 (0.62)	2.78 (0.67)	Z = -1.19	> .1
Stunkard Fig – Discrepancy (Actual-Ideal)	1.2 (1.1)	0.6 (0.7)	Z = -1.66	0.097
Bulik Discrepancy Score BMI – Actual BMI	- 2.29 (2.80)	- 0.72 (1.55)	5.34	0.03
Singh – Current Size (Mean Rank)	25	22	Z < 1	> .1
Singh – Current shape	0.82 (0.11)	0.81 (0.11)	< 1	> .1
Singh – Ideal Size (mean Rank)	24	24	Z < 1	> .1
Singh – Ideal Shape	0.76 (0.07)	0.77 (0.11)	< 1	> .1
Singh – Attractive Size (Mean Rank)	24	23	Z < 1	> .1
Singh – Attractive Shape	0.77 (0.10)	0.76 (0.09)	< 1	> .1
DEBQ-R	3.1 (0.9)	2.7 (1.0)	2.41	> .1
DEBQ-X	4.5 (0.5)	4.2 (0.4)	8.41	0.01
EDI-BD	10.9 (7.6)	7.6 (6.8)	2.37	0.1
Overall sense of control	4.5 (0.9)	5.1 (0.6)	6.45	0.02
Negative control	3.5 (1.0)	2.9 (0.7)	5.95	0.02
Positive control	4.5 (0.9)	5.0 (0.8)	3.80	0.06
Desire for control	4.8 (0.8)	4.7 (0.9)	< 1	> .1
Attentional Control	44.5 (7.2)	50.0 (7.0)	6.68	0.013
DASS-Depression	13.6 (10.7)	9.3 (7.7)	2.38	0.1
DASS-Anxiety (outlier removed)	7.2 (7.2)	7.1 (6.3)	< 1	> .1
DASS-Stress	15.9 (8.8)	14.8 (11.9)	< 1	> .1
Self-Esteem	14.9 (2.4)	15.3 (3.3)	< 1	> .1
Body Checking and Avoidance	53.0 (15.9)	46.4 (16.8)	1.85	> .1
Body Shape Questionnaire	104 (34)	85 (33)	3.51	0.07
Degree of Subjective overweight (%)	3.2 (3.1)	2.9 (2.0)	< 1	> .1
One or more diets in Past Year (No. of People Reporting)	17	10	$\chi^2 = 4.39$	0.04

Looking at table 7.5 it can be seen that High-emotional eaters exhibited significantly higher scores on the DEBQ-X than the low-emotional eaters. This implies that their eating

patterns are more readily influenced by outside variables than those classified as low-emotional eaters.

High-emotional eaters showed some evidence for higher body dissatisfaction than the low-emotional eaters, with a non-significant trend towards higher levels of body dissatisfaction than low-emotional eaters using the EDI-2-BD and BSQ measures. In addition, the high-emotional eaters evidenced a greater discrepancy between their ideal and current size than did low-emotional eaters using the Bulik et al. (2001) discrepancy measure. Furthermore, a significantly higher number of high-emotional compared to low-emotional participants reported having been on a diet within the past year.

The area of control demonstrated the greatest degree of discrepancy between the two groups with high-emotional eaters showing a lower overall sense of control as well as a trend towards a lower sense of positive control than low-emotional eaters. In addition, the high-emotional eaters demonstrated a higher level of negative control than the low-emotional eaters. Interestingly, the high-emotional eaters were found to report significantly lower levels of attentional control compared with the low emotional eaters.

Finally, the high emotional eaters showed a non-significant trend towards a higher level of reported depression than the low emotional eaters.

7.3.2.2. Group characteristics - reaction time data

Differences in Reaction Times as a Function of Emotional Eating Status, Image Type and SOA (Gap Time)

Median reaction times for each participant in each condition for each SOA were calculated. An overall mean was then calculated for each of these conditions. A 3-factor ANOVA found only the main effect of SOA previously illustrated in section 7.3.1.2. No main or interaction effects of emotional eating status were found (p values > 0.05).

Differences in Reaction Times as a Function of Emotional eating Status, Image Type (Overall Body vs. Neutral) and SOA (Gap Time)

Reaction times for fat and thin body types were collapsed into a singular 'body' category and the data reanalysed. Only the overall effect of SOA was found (see section 7.3.1.2). No effects of emotional eating status were found (p values > 0.05).

7.3.2.3 Body image ratings

1. Ratings of Body Size

Mean ratings for fat and thin images were subjected to analyses in order to see whether or not emotional eating status would impact on the overall outcome. No effects of emotional eating status were found (p values > 0.05)

2. Ratings of Body Attractiveness

Analysis on ratings of body attractiveness found no significant effects of emotional eating status (p values > 0.05).

7.3.2.4 Error rates - do error rates differ as a function of emotional eating status and body type?

No significant effects of emotional eating status were revealed (p values > 0.05).

7.4 DISCUSSION

7.4.1 Disengagement and timecourse

The current study aimed to look more closely at the time course of disengagement in non-clinically eating disordered individuals when faced with potentially threatening images.

It was predicted that the high-restrained but not low-restrained eaters would take longer to disengage from fat images at the initial stage of attention (e.g. 200-500 ms SOA/ 0-300 ms gap time) but would show avoidance at later stages (e.g. 1500 ms SOA/ 1300 ms

gap time). This prediction was not fully supported. In fact all participants, regardless of restraint or emotional eating status, showed increased reaction time latencies for all types of image in the 200 ms SOA/ 0 ms gap time condition. This is unsurprising in light of the evidence from Perry and Hodges (2003) and that from gap time studies. Perry and Hodges, for example, talk of an interference effect that results in individuals showing a functional blindness, lasting up to 500 ms, to targets that rapidly follow a preceding stimulus. Farroni et al. (1999) and Danckert and Maruff (1997) state that when attention is still engaged on a stimulus the saccade system is inhibited. Therefore when there is no gap between the offset of a stimulus and the onset of the target, all the events related to saccade preparation still have to take place before a response to a target can be initiated. McSorley and Findlay (2003) affirm that saccades are used to scrutinize a visual scene at a rate of 3 – 4 movements per second, that is, they occur at a rate of approximately one every 250 ms. Rayner (1998) asserts that between each saccade there is a period of time where our eyes remain relatively still. These periods are called fixations, and when reading, performing a visual search or looking at a scene, they range between 200-300 ms, with the mean fixation during scene perception being 375 ms. Visual attention inhibits saccades to targets appearing in the periphery when it is simultaneously engaged by a central stimulus (Farroni et al., 1999). The targets in the present study were sufficiently small that the participants would not have been able to correctly categorise them unless they actually shifted their gaze towards them. Before a response could be made, attention had to be disengaged from the centrally appearing stimulus, saccades initiated and attention re-engaged at the target appearing in the periphery. Only after this has occurred could the participant begin to make a decision as to the orientation of the target. This series of events results in increased RT latencies to the target. However, when a gap was introduced between the offset of the target

and the onset of the stimulus, the aforementioned series of events had likely already been initiated or completed before the appearance of the target leading to a reduction in RT latencies in comparison to the 'no gap' condition.

It was interesting to see a trend towards faster disengagement in the 1500/1300 ms SOA/gap for high-restrained participants compared to low-restrained participants. This suggests that this group were showing some evidence of a vigilance-avoidance pattern with initial slow RT latencies being replaced with much faster disengagement. However, this pattern was true for all images rather than just the body images. It is possible that the continual presence of threatening stimuli in the form of fat and thin bodies alongside neutral stimuli may have led to a response bias, resulting in the vulnerable participants treating all stimuli as potentially aversive. This may imply that a 'build up' of negativity or threat can occur when there is continual exposure to body-related stimuli that carries over to all stimuli. This may occur particularly when one stimuli follows another in a continuous fashion. Mackintosh and Mathews (2003) have intimated such a possibility in their own research. They suggest arranging positive and negative stimuli in separate blocks (with the order of exposure counterbalanced across participants) in order to assess the impact of positive and neutral stimuli before exposure to more negative stimuli. Therefore, future work in this area should consider using this method.

It is possible that a presentation time of 200 ms is too short a period for differences between participants to occur, particularly when non-clinically disordered individuals are involved. However, Koster et al. (2005) and Fox et al. (2001) found that at very short presentation times (100 ms) a difference in RT latencies was present between threatening and neutral stimuli, with all participants orienting towards threatening stimuli. In addition Fox et al. found differential responding between the anxious and non-anxious groups at

presentation times of 250 ms. Although, the participants in the present study appeared also to elicit longer times for neutral images as well as body images, it must be recalled that error rates for this category were again significantly greater than those in the other conditions. The increased novelty of these items amongst body images may be responsible for an increase in reaction time latencies so that they matched those of the body images.

It appears that the time between 100 and 250 ms may be critical for the appearance biases in early orienting of attention. The threshold for biases was obviously missed in the present study. Future studies may consider more finely dividing up this time to correctly identify the threshold moment of bias.

The lack of group differentiation for the 500 ms condition is not altogether surprising as other researchers (see section 6.1) found a lack of differentiation between low and high anxious groups between these two time periods (e.g. Calvo & Avero, 2005; Rohner, 2002 and Hermans et al., 1999). Although Koster et al. (2005) did find avoidance in high anxious participants at 1250 ms.

7.4.2 Emotional eating, control and weight concern

As mentioned in the discussion of the previous chapter, it is entirely possible that the participants in the present study did not experience a sufficient level of weight and shape concern and body dissatisfaction to elicit strong effects in response to the body images used in this study. It should always be recalled that they were a 'normal' population. It has already been noted earlier in this thesis that biases are less likely to be found in non-disordered populations (see section 2.2.2).

The self-report data for high-restrained eaters gave similar results to previous studies as regards body dissatisfaction, body checking and weight and shape concern. However, they did provide some relevant results as regards the issue of control. Firstly,

contrary to the previous studies in this thesis, the high-restrained eaters evidenced a lower sense of overall control than the low restrained eaters. In concert with this they appeared to be experiencing lower levels of a positive sense of control and higher overall levels of negative control. This pattern very much follows that of individuals with clinical eating disorders (Surgenor et al., 2003; Shapiro et al., 1993) and has so far in this thesis only been found in high-emotional eaters. Interestingly, the high-restrainers did not experience an increased *desire* for control. However, it may be that they feel that they are incapable of gaining extra control (evidenced by a high level of negative control), and so a desire for extra control may seem a futile exercise. It would have been illuminating to explore the modes of control used by this group in which to gain control. The high-emotional eaters, who also experienced higher levels of weight and shape concern than their low emotional counterparts, again showed this pattern. In addition, they demonstrated higher levels of body dissatisfaction as evidenced by higher discrepancy scores on both Stunkard et al. (1983) and Bulik et al. (2001) scales. Again, the high-emotional eaters reported a higher level of external eating behaviour than the low-emotional eaters. This finding appears to confirm previous research than found a relationship between external and emotional eating (e.g. Wardle, 1987) and between emotional eating and weight and shape concern (Eldredge & Agras, 1994), and has already been discussed in section 6.4.2.

There was no significant difference between high- and low-restrained eaters on the measure of attentional control. However, a difference was found between high- and low-emotional eaters, although this did not appear to impact on the reaction time data. It is important to note however the actual mean scores for each of the restrained and emotional eating groups. The values were generally between 45 and 50. In the original study carried out by Derryberry and Reed (2002) participants were divided into high and low attentional

control by virtue of a median split value of 52.2. Therefore, it seems likely that most of the current participants would have been placed in the low attentional control grouping. However, all of the group mean scores in the current study were very close to this median split. Therefore, they appeared to lay midway on the continuum of attentional control. Perhaps if participants had obtained scores that were more distinctive, that is, very low or very high, then attentional control may have been seen to have more of an impact on behaviour.

In conclusion, no real differences in disengagement from threat-related body images were found between the either low- or high-restrained or emotional eaters in this study. However, some interesting issues were raised as regards the time-course of attention in these groups. In addition, the self-report data evinced some patterns that are worthy of note and that also served to corroborate existing research relating to eating behaviour.

The next and final chapter of the thesis will draw together the findings of the series of studies outlined in the previous four chapters and will attempt to integrate these findings into what is currently known about attentional bias research in the eating disorders.

CHAPTER 8

DISCUSSION

The purpose of the following discussion is to draw together the findings generated by the preceding studies and to integrate this new knowledge into prior knowledge of attentional processing in non-clinically eating disordered individuals. Issues relating to the continuity debate, the nature of attentional processes and the future of attentional bias research will also be discussed. Additionally, the topics of control, emotional eating, body image and attractiveness will also be examined.

8.1 OVERVIEW OF AIMS AND OBJECTIVES

The principal aim of this thesis was initially to ascertain whether or not non-clinically eating disordered women showed patterns of weight and shape related bias similar to those with clinically diagnosed eating disorders. If this were the case, the secondary aim was to more adequately define the mechanisms involved in the operation of these biases.

Cognitive behavioural theories of eating disorders posit that eating disordered individuals exhibit schema-biased information processing, through selective attention to schema-congruent information. This biased processing serves to maintain the disorder. The most common treatment for eating disorder is CBT. Despite its widespread use, successful outcome rates remain moderate (section 2.1). Cooper (2005) believes this to be owing to a lack of sophistication and refinement of current theories. Yet whilst research on cognitive behavioural mechanisms involved in anxiety disorders is moving on apace, and researchers in this field are using increasingly more sophisticated methods in order to explore these mechanisms, the same cannot be said for the field of eating disorders. Research that looks at the underlying structure of schema-biased processing in

eating disorders still relies on indirect means such as the emotional Stroop task, and the problems associated with this method were discussed in Chapter 2 (see section 2.2.3).

Whilst eating disorders researchers are beginning embrace more direct and sophisticated methods such as the visual probe task (e.g. Rieger et al., 1998), progression is slow. The present work therefore attempted to take a more progressive and sophisticated stance in order to gain a more detailed knowledge of weight- and shape-related attentional processing in non-clinically eating disordered women.

Anxiety researchers have carried out a great deal of research on non-clinical forms of anxiety and much work has gone into differentiating the mechanisms involved in state and trait anxiety and how they compare with conditions such as GAD and clinical phobias. However, within eating disorder research, those with non-clinical eating disorders are seldom studied as a group in their own right. More often they are used as comparison groups in studies where the main concern is clinically disordered populations. Moreover, there appears to be no consistency in the type of comparison group used. Restrained eaters are commonly used in this capacity. This is problematic, as many different measures of restraint exist and it is uncertain as to what each measure is actually assessing, and whether or not they are all assessing the same phenomenon. Therefore, any conclusions drawn based on one group of restrained eaters may not be equally applicable to another where classifications have been made using a different measure. Other studies use dieters as comparison groups and again definitions differ across studies. One theme raised early on in the current work (section 1.3.5) was the way in which dieting and restraint are used as interchangeable constructs. Results from studies outlined in Chapters 4 and 5 suggests that perhaps the underlying cognitions of

these two groups are not the same, and that dieting and restraint are largely separate entities. This theme will be examined further in the upcoming discussion.

The rationale behind a more adequate understanding of implicit cognitions in those with clinical eating disorders is clear – the refinement of existing theories and the hope of more effective and targeted treatments. What is less clear is why it is important to further explore the cognitions of those with non-clinical eating disorders. There is a long-standing and still ongoing debate as to whether or not restrained eaters or dieters lie midpoint on a continuum of eating behaviour, with normal eating at one pole and full-blown clinical eating disorders at the other (section 1.5). Similarly, for many years dieting in particular has been accused of being a precursor of eating disorders (section 1.3.7). Given these facts it must surely be recognised that studying those who diet, along with others who manifest aberrant eating patterns, may go some of the way towards early recognition of those who are vulnerable of developing clinical eating disorders and thus allowing preventative action to be taken. In addition, an increased knowledge of cognitive processing in non-clinically disordered individuals may enable the development of more effective prevention programs for vulnerable groups and treatments for those already showing signs of disordered eating patterns.

The following sections will look at the aforementioned issues and will discuss how the current work has at least in part addressed these issues. It is recognised that many more questions have been raised by this research than have been answered. However, this is considered a positive outcome as it ensures that the field of eating disordered related research remains dynamic, fresh and fertile. Ideas for future work will be discussed along the way in an attempt to address these new questions. Issues have

been raised and valuable lessons learnt as regards methodology and these will also be discussed.

It is acknowledged that the issues involved with eating disorders and their associated problems are complex and multi-causal in nature and that no one factor can ever be held responsible for their development or maintenance. Similarly, no singular work could ever hope to address all of these causal factors. Therefore, the aim of this thesis was not to unlock the mysteries involved with the aetiology and maintenance of disordered eating. Its aim was merely to build on current work and to illuminate the importance of recognising that non-clinically eating disordered groups exist and that their concerns can affect quality of life and are therefore worthy of further exploration.

An issue not directly confronted in this thesis is the problem of male eating disorders. This does not mean that male eating disorders are deemed unimportant. However, the topics tackled in the current thesis reflect the overriding concentration on female eating disorders within the research field. Therefore in order to make direct comparisons with existing work, the current work has necessarily had to focus solely on females. This means that the conclusions drawn from this work will not directly apply to males (predominantly because female body images have been used). However, the methods used in this work would be transferable to studies that wish to investigate biases in male participants.

8.1.1 Summary of findings

The pilot study (Chapter 3) aimed to collect together a 'gold standard' set of images that reflected the type of women that might be seen in everyday life. More specifically, the aim was to define two groups of images, thin and fat that could be used in subsequent studies. This aim was achieved and the utility of these groups was supported throughout

the subsequent set of studies. The studies outlined in Chapters 4 and 5 set out to discover whether or not biases towards body images and more specifically fat images, were present in high-restrained and high-emotional eaters and dieters. The fact that only high-restrained eaters were found to exhibit such biases raised questions for the continuity debate that posits that dieters fall high up on the continuum of disordered eating behaviour. That emotional eaters showed a tendency towards the same patterns of bias is interesting and leads to way to more detailed research into this groups who up until now have not been adequately explored in terms of implicit cognitions. The topic of competition was also addressed. It was found that the pattern of bias differed depending on the nature of the image with which it was paired. This is something that so far has not been adequately dealt with within the field of attentional bias research, which typically pairs threatening and neutral images rather than two valenced images. Chapter 4 also raised the possibility that biases in attention may not be owing to an increased vigilance for threat but rather a difficulty to *disengage* from threat. This was exciting because it appeared to go contrary to theories of eating disorders that posit that maintenance of the disorder is down to individuals preferentially seeking out disorder congruent information. Finally, Chapters 6 and 7 explored more directly the topic of disengagement. The results did not appear to support the disengagement model put forward in Chapter 4. However, they did raise some interesting questions regarding the timecourse of attention.

In addition to the main issue of attentional bias, the studies also explored the topics of beauty and attractiveness and their links to societal ideals. Evolutionary influences such as health and fecundity were suggested as partial explanations for the widespread positive association between thinness and beauty.

The multidimensional nature of control was explored throughout all of the studies. The SCI (Shapiro, 1994) was thought to be an improvement on existing measures that have predominantly concentrated on just the internal and external locus of control; and have failed to see control as a multidimensional concept defined by a much more complex set of variables. A decreased sense of overall control was found to be predominantly associated with increased scores on the emotional eating scale. Such a pattern is thought similar to those who display bulimic or binge-eating behaviour and may pinpoint vulnerable individuals who are at particular risk of developing this type of eating disorder. The discussion sections of each of these chapters have aimed to explain the minutiae of issues relating to methodology and experimental design. The following sections endeavour to integrate the findings into the wider context of the field of eating disorders and their related issues.

8.2 FATNESS – AN UNACCEPTABLE STATE

In section 1.1 of this thesis, Nancy Etcoff and Susie Orbach in the Dove™ Report (2004) both alluded to the contraction of the concept of beauty to one where it was reduced to the physical state of 'thinness'. For many, the idea of physical attractiveness is inextricably linked with thinness. The quote from an eating disordered woman represented by Fairburn (1995) in section 1.3.1 illustrates this point well. For this woman, confidence, self-worth, physical attractiveness and future hopes were all dependant on her being thin. This is a commonly held belief and although the behavioural measures used to obtain this 'holy grail' (e.g. purging activities) may be more extreme for those with clinical eating disorders, the belief is no less present in non-disordered women. This was clearly illustrated in the 'Pressure to be Perfect Report'

(FAB, 1998) and is thought to be due in the main to societal conditioning. But how does this play out in the 'real world'? Would a group of young, socially aware women still judge fatter women as less pleasant or attractive than those rated as thin? The answer to this question is a resounding yes. Four separate groups of female participants were asked to rate the images of fat and thin women in swimwear. On each occasion regardless of whether or not they were high or low restrained or emotional eaters or dieters, the women rated the fat images as significantly less attractive/pleasant than the thin images. However, this result does not necessarily signify a concordance with this edict by the women in the study. For example, one participant stated that she had felt extremely uncomfortable rating the fatter images as less attractive. It is likely that she was not alone in her reluctance to make this judgement. This unwillingness may be tied up with what, on a more judicious level we know to be true that is, the notion that 'beauty is more than skin deep'. This is illustrated by the Dove™ Report where when questioned more deeply about their feelings regarding beauty, the women stated that *feeling* beautiful was more about internal characteristics like confidence, happiness and being loved. The tasks in this study called for more of a 'first impression' judgement and are realistic of the type of judgements that are made everyday when we see or meet someone for the first time. It would be interesting to see whether or not knowing personal information about the women portrayed in the images would ameliorate or worsen their attractiveness and pleasantness ratings, even when participants were asked to judge solely on body shape/weight.

8.2.1 The thin advantage – evolutionary arguments

The ideas in this section may be considered controversial. However, the field of evolutionary psychology remains both popular and fruitful and provides an interesting alternative to the dominant societal/cultural explanations promulgated by many in the field of eating disorders.

The possibility that both males and females see thin women as more attractive may not be entirely the fault of societal influences. This is a possibility put forward by evolutionary psychologists and biologists (e.g. Singh, 1994). It is not the intention of the current work to review in detail either the process or the arguments surrounding the evolution of mate attraction. Interested readers are referred to 'The Red Queen: Sex and the Evolution of Human Nature' (Ridley, 1993) for a more detailed exposition of the subject.

If evolution is found to play a role in the judgement of attractiveness, then the guilt experienced by the participant in the present study may be unjustified – perhaps she is influenced by her genes as well as society. Chapter 5 attempted to explore this possibility in more detail looking at the contribution of WHR and body size (BMI) on ratings of attractiveness. A low WHR is linked with increased fecundity, general health and youthfulness (Singh, 1993, 1994, 1995). In support of these findings the results from Chapter 5 found that the fat images had significantly larger 2DWHR than the thin images, and that they were rated less attractive and significantly older than the thin images. In terms of mate selection theories it would seem rational that the fatter, 'older' women were regarded as less attractive as this was naturally linked with reduced fecundity and a reduced chance of producing successful and healthy offspring. The seemingly puzzling aspect of these findings is that women were rating other women. It is

easy to see why males would make these judgements regarding females but why would women be making judgements on other women based on mate selection? Tovée and Cornelissen (2001) suggest a plausible explanation. They believe that making accurate judgements of another woman's attractiveness would allow women to determine their own relative worth, as a mate, with respect to their female contemporaries. They would then be able to match this value with what they believed to be the values of prospective (male) mates.

It has also been hypothesised that evolution may be responsible for the differential results obtained in attentional bias research. Chapter 6 discussed the results obtained by Buodo et al. (2002) who found that stimuli of evolutionary significance (i.e. sex scenes) evinced longer RT latencies (signifying deeper processing) than less significant scenes, even where these scenes were of personal interest or significance. There is no real conclusion to this debate other than to say it is worth considering the influence of evolution when trying to understand the high value given to certain attributes (e.g. thinness) by males *and* females and when considering the results obtained from attentional research. Nonetheless, the fact that some endow these attributes with more value than others surely owes more to societal influences. Of course, it should be acknowledged that the real ages of the models used in the study were not known. There is always the possibility they *were* actually older than the thinner models. In addition, neither the BMI nor WHR of the models were known. Future research may wish to use photographs of real life models where the age, BMI and WHR are known. However, the present method provides a useful insight into the evolutionary aspect of the decision-making processes involved in appraising age and attractiveness. In addition, it presents avenues for future work on the subject.

8.2.2 The thin advantage – societal arguments

Society also plays a role in the 'thin is beautiful' argument. The Dove™ Report (2004) highlighted the fact that many women believe that beautiful women receive better opportunities in life. Similarly, Vitousek and Hollon (1990) talk about the "dense associative networks" (p.96) built up by those with AN, that typically link thinness with positive attributes such as beauty, self-control and intelligence. Fatness on the other hand has more negative connotations, with overweight individuals generally being thought of as lazy, ugly and stupid. More awful than these for the often-perfectionistic individual with AN, is the connection of fatness and failure – an almost unconceivable and unbearable outcome. To most non-disordered individuals, these associations may, on the surface, seem nonsensical. Indeed, a major goal of any therapist would be to dispel this myth. However, this job is made increasingly difficult when new reports emerge that seem to strongly *support* this 'myth'. Personnel Today (Dan Thomas, 25th October, 2005), a weekly news magazine that serves the human resources profession, carried out a survey that questioned 2000 human resources personnel on their views regarding current and prospective obese employees. The findings make uncomfortable reading. The report found that individuals who were obese had a reduced chance of promotion, were discriminated against when applying for a new job, and sadly, were more likely to be made redundant than their slimmer counterparts. Given this information, the apparently irrational associative networks present in those with AN no longer seem quite so unreasonable. It is hardly surprising that fatness is considered such a threat and that thinness is seen as having "inestimable worth" (p. 128; Vitousek & Hollon). It is even easier to see why vulnerable, non-clinically eating disordered women may build up similar associations, and why the fat images of women used in the present

study were consistently rated as less attractive than the thin images. A change of attitude at the societal level is obviously required if we are to attempt to break down these objectionable associations between fatness and failure.

8.3 THE ELUSIVE NATURE OF ATTENTIONAL BIAS

Previous research that has looked for weight and shape related attentional biases in non-clinically eating disordered individuals have led to equivocal conclusions. The current work has possibly added to the confusion. Chapter 4 initially appeared to support the idea that high-restrained eaters showed a bias towards fat images when they were paired with images of a neutral valence. However, this result was apparently reversed when fat and thin images were placed in competition. It appears that these types of biases are not as straightforward as first thought. More positively, the current work has succeeded in raising awareness of possible confounding factors that may play a role in the apparent instability of attentional biases in this field. The following sections will examine these factors in more detail.

8.3.1 Conflicting results - the role of competition

The results in Chapter 4 were not clear-cut. Whereas, high-restrained eaters showed a bias towards the fat stimuli and a trend towards a bias away from the thin stimuli when they were paired with neutral stimuli, differential results were found for fat-thin pairings. A similar although less convincing result was found in high emotional eaters. There has been predominance for visual probe studies to pair threatening stimuli with only neutral stimuli. However, as Mackintosh and Mathews (2003) pointed out, a *better* test of any attentional differences would be found by pairing negatively and positively valenced stimuli within the same display. These authors proposed that during the

execution of a task requiring a degree of cognitive effort, an inhibitive mechanism is triggered that impedes the processing of any mildly threatening or valenced stimuli that appear in the environment. However, when more threatening or highly valenced stimuli enter the environment, this mechanism is released allowing attention to focus on potentially dangerous or significant scenes or objects. This explanation seems plausible as in everyday life it would be extremely disruptive if attention were drawn to every new thing that appeared in the immediate surrounding. Similarly, in terms of survival it is adaptive to have a system that brings into awareness something that may cause harm and to which an instant response is required (e.g. fight or flight). In terms of the current study, the thin images may have been considered relatively non-threatening. Viewing thin images in the media is the norm. Moreover, they were considered attractive by most of the women participants. However, it is less usual to see fatter women in the media, and additionally, fatness is associated with a myriad of negative outcomes. The possibility is that to women with heightened concerns regarding their weight, fat images are perceived as higher in valence, threat value and negative affect. In this way they can be likened to the highly valenced images from the Mackintosh and Mathews study, so that when paired with neutral images they had the capacity to immediately grab attention. However, when placed in direct competition with the thin images, the fat images were perceived to be the more distracting of the two and therefore inhibited. This would have limited disruption to the ongoing cognitive task, specifically, the visual probe task.

The idea that the relative *novelty* of the fat images caused the bias to occur should be addressed. As previously discussed, it is less common to see fat women in magazines, catalogues and on the television or in films. Moreover, it is especially

difficult to find fatter women modelling swimwear for retail purposes, and less usual to see them wearing garment such as bikinis on the beach. Therefore, the sight of fatter women in swimwear and in particular bikinis may have attracted attention. However, the item analyses in Chapter 4 revealed that it was unlikely that any one of the images was leading the result. Furthermore, if novelty alone was driving the result, we may have expected to see the bias in all participants not just those high in restraint.

8.3.1.1 Singularity – The Problem with a Lack of Competition

A further issue that should be explored is the way in which the images are presented to participants. In some instances stimuli are presented onscreen alone whilst on other occasions they appear in pairs or more. Mathews and Mackintosh (1998) believe that competition is critical when examining attentional effects. They believe that:

> It is the attentional priority accorded to threat in preference to other cues, rather than the efficiency of processing threatening information per se, that characterises anxiety. (Pp. 540-541).

This is an interesting argument and may be useful in explaining the apparently opposing results in Chapters 4, 6 and 7. Mathews and Mackintosh (1998) proposed an explanation based on a connectionist or parallel distributed processing network that operates by means of inhibitory links. Within this network, already threatening stimuli are further strengthened by carrying an 'emotional tag'. This may be present as a result of prior learning or through biological preparedness. Mathews and Mackintosh believe that this tag endows the threatening stimulus with an advantage over any other competing stimuli that are present within the network. This occurs by ensuring that a secondary attentional allocation mechanism is triggered which then allocates further attentional resources towards the threatening stimuli. As this gains activation, attentional resources towards other competing stimuli are inhibited. Hence, the dominant, threatening stimulus

succeeds in capturing attention and, therefore, access to awareness. However, when only a single stimulus is present, it is able to control the whole attentional network whether or not it possesses an emotional tag.

Chapters 6 and 7, nonetheless, do discuss tasks that have used singular presentations and that do find differential effects between differentially valenced stimuli (e.g. Buodo et al., 2002). The study by Buodo et al. makes it clear that the type of threat used is key in the emergence of attentional biases. The explanation put forward by Mathews and Mackintosh (1998) is complex and may go part of the way in explaining the lack of a threat-related bias in Chapters 6 and 7. However, as discussed in detail in these chapters the issue of timecourse of attention plays a crucial role in the detection or attentional biases, and it is this that will be reviewed in the following section.

8.3.2 The thorny issue of timecourse

Firstly, it should be stated that a whole thesis could easily be dedicated solely to the matter of timecourse of attention. However, it was not the singular purpose of this thesis to investigate this phenomenon. Therefore, in no way can it be said that the issue has been covered in its entirety; it has served to merely scratch the surface. However, it cannot be denied that timecourse plays a key role in the detection of biases in attention in certain groups of individuals. Indeed Calvo and Avero (2000) highlighted the key role played by timecourse in the apparent high level of discrepant results found in the field of anxiety research. A vast amount of studies purporting to measure attentional biases in anxious individuals have taken place and only a few of these have been discussed in the present work. However, even amongst these few studies, discrepancies exist. These may only be small. That is, some studies may measure response after 300 ms and others after 500 ms and still others after 1500 ms or more. However, although the matter of

milliseconds may seem trivial, it appears to make a vast difference to the outcome of the study. There do however appear to be matters on which there is a level of agreement. For example, image display times of 500 ms are thought to be too long (e.g. Koster et al., 2005; Fox et al., 2001; Mogg, Millar & Bradley, 2000). This is an important finding principally because many of the studies carried out on anxious individuals, and almost all of the research carried out on those with eating disorders, have used stimuli display times of 500 ms. Using this display time may be producing misleading results. Biases found at this time may not be indicative of an *initial*, automatic propensity to attend to schema congruent information as is often suggested, particularly in eating related research. As discussed previously in Chapters 6 and 7, during any 500 ms period an individual may be able to make more than one shift of attention. It is possible that this is related to *early* attentional engagement (Calvo & Avero, 2000) however. In addition, Calvo and Avero believe that disengagement difficulties found at this stage are indicative of slowed disengagement (or prolonged engagement) as opposed to faster disengagement (or facilitated avoidance). The results obtained for high-restrained eaters in Chapter 4 are probably suggestive of this slowed engagement and reflect a bias occurring at an early (but *not* initial) stage of attention.

The lack of evidence for slowed disengagement in the studies outlined in Chapter 6 and 7 is difficult to explain and it is likely that many factors are to blame. However, these studies are not alone in failing to find evidence for biased attention. Calvo and Avero (2000) and Hermans et al. (1999) in their eye monitoring studies also failed to find biases between 500 – 2000 ms. Similarly, Fox et al. (2002) and Yiend and Mathews (2001) failed to find significant biases when SOAs of 960 and 2000 ms were used. This

was just the time period covered by the studies in Chapter 6 and 7. Therefore, it is possible that biases were present but were missed by these studies.

The most interesting and illuminating results in the field of attentional bias have been found by studies that utilise eye tracking. This allows a picture to be built up of the continuous viewing patterns of individuals over a set period of time. The effects of competition may also be observed, as stimuli can be presented singularly or in pairs (or more). However, the use of this type of study, whilst valuable, does not negate the usefulness of 'snapshot' research such as the visual probe task. Such tasks are useful for measuring biases at particular time points. In addition, eye-tracking studies can be time consuming and the analyses complex. Moreover, not everyone has ready access to the facilities to carry out such research. Perhaps a first step for those concerned with attentional biases in the eating disorders would be to carry out eye tracking studies in order to give a clearer picture of the pattern and timecourse of these biases. This would allow future research using tasks such as the visual probe to make more informed decisions as regards the timing of stimuli presentation rather than the usual 'shot-in-the dark' approach. It is crucial for the validity and interpretation of attentional bias research that researchers are clear about the stage of attention they are actually exploring, as it can be seen that results differ significantly depending on the time at which responses are collected. Up until now the field has sought an increased knowledge of *initial* automatic engagement, but it is doubtful whether this has actually been achieved owing to the long presentation times used in such research. This may be owing to a lack of knowledge as regards the mechanisms and timecourse of attention, although this is understandable as the field of attention is a complex one. However, taking the lead from those in the anxiety field would provide a useful foundation from which a more sophisticated

approach to attentional bias research in those with eating disorders could be initiated. There is no doubt that an increased knowledge of all stages of attention would serve to give a clearer insight into the mechanisms involved in attentional biases, which in turn could lead to more advanced and improved therapeutic approaches.

8.3.3 Disengagement – a cause for redefinition of existing theory

A major finding of the current work was that the underlying mechanism involved in the apparent schema-congruent bias shown by high-restrained eaters was owing to a difficulty to *disengage* from this information. All existing theories that seek to explain the aetiology and maintenance of eating disorders attribute biases to an increased *vigilance* for schema-congruent information. Should similar results be found for clinically eating disordered individuals, this would constitute a significant step-forward in our knowledge. Not only this, but it may allow the development of more focussed treatment approaches (Fox et al., 2001), with the concentration moving to one where individuals were assisted in their ability to break away from negative information (Koster et al., 2004).

It is acknowledged that the same pattern of slowed disengagement was not found when using more direct measures (Chapters 6 & 7). However, the difficulties inherent in these tasks have already been discussed (timecourse, the use of single stimuli etc.). Furthermore, a different set of participants was used in each of the studies and therefore null results may have been owing to between group differentials. Future work may consider using a repeated measures design in order to compare results from the visual probe task with those from more direct measures of disengagement.

8.3.4 A lack of bias – failure to reach clinical levels of concern

Research that has sought to look for biased attention in non-clinically disordered women has so far produced equivocal results. Complex reasons relating to timecourse, competition and the use of word stimuli have all been suggested as reasons for this lack of a clear-cut conclusion. A simple explanation for the null results outlined in Chapters 5 – 7, is that the women taking part in the study were just not concerned enough about their body image. That is, not in comparison to clinically eating disordered women. Vitousek and Hollon (1990) along with other proponents of eating disorders theory talk about weight and shape related self-schemata and complex associative networks that are used to interpret, simplify and sometimes even alter incoming information so that it supports the inherent beliefs of the individual. It cannot be denied that some of the women taking part in the present set of studies showed an excessive degree of concern about their weight and shape. Moreover, for some, this had an effect on their eating behaviours leading to high levels of restrained or emotional eating or dieting. Scores for high-restrained eaters for example were higher on measures of body checking, dissatisfaction, weight and shape concern, restraint and emotional eating compared to low restrained eaters. However, they often failed to reach *clinical* levels of concern (see section 6.4.2). Even if the scores on these measures did reach a level usually found only in clinically disordered individuals, the possibility remains that the underlying *structure* of their cognitions are fundamentally different to those with clinical eating disorders. As described in section 1.6.1, Vitousek and Hollon speak of this difference. They state that the sense of what it *means* to be fat or thin is "more elaborated, idiosyncratic and emotionally charged" (p. 196) for the individual with a clinical eating disorder. In addition, the "dense associative networks" (Vitousek & Hollon; p. 196) found in

clinically disordered women, may not be present in non-disordered women. Crucially, the presence of such networks may be a key factor for the development of clinical eating disorders. Most of us associate fear with entities that have the propensity to cause real harm, such as guns, or dangerous animals. The possibility that hearing or seeing the word 'fat' or viewing a picture of a fat woman could induce the same level of fear is difficult for most of us to imagine. However, for the woman with an eating disorder, the consequence of becoming fat is unbearable, bringing with it the intense feeling of failure and unattractiveness and the possibility of a bleak future without love, respect or success.

Section 1.3.1 outlined the relationship between body dissatisfaction, the commencement of dieting and the development of full-blown eating disorders. Being dissatisfied with one's body may not be enough to initiate disordered eating behaviour of a clinical level. It is likely that these highly affect-laden networks need to be present in order for biases to become evident and for the development of more disordered cognitions and behaviour. The fact that some women, including those high-restrained eaters in Chapter 4, do appear to show evidence of biases may be because those who experience these deep seated feelings are more likely to evince high-restrained behaviour in order to achieve their aims. This does not mean however, that all highly restrained eaters hold these beliefs. The questionnaires used in the present study may not have been sophisticated enough to capture the workings of the deeply entrenched beliefs experienced by those with clinical disorders. Therefore, future work with highly restrained groups or dieters may consider including measures that can adequately assess core beliefs.

8.4 All non-clinical eating disorders are *not* the same – the problem of over inclusivity

As discussed in section 1.4.5, Herzog and Delinsky (2002) and Walsh and Kahn (1997) have highlighted the problems associated with the accurate classification of eating disorders. They believe that classification shaped the way in which research funding was used and determined the type of participants who were eligible for research. The outcome of this is that many eating disordered individuals are missed out of research and treatment trials even though the information that they could provide may be extremely valuable to the further understanding of eating disorders in general (Dancyger & Garfinkel, 1995). Most of these individuals have EDNOS the "Cinderella state" of eating disorders (Fairburn & Bohn, 2005: p. 5), a category described as over-inclusive by Gordon (2000). The individuals within this category represent a miscellany of individuals, each with different reasons for exclusion from the main categories of eating disorder, making cross-study comparisons difficult. A further criticism of the category was the general assumption that individuals within these groups are somehow less disordered, an assumption found to be untrue (e.g. Fairburn & Walsh, 2002; Dancyger & Garfinkel, 1995; Bunnell et al. 1990).

Whilst these problems with categorisation are now recognised in clinically disordered individuals, the same cannot be said of non-clinically eating disordered women. Many different categories of 'non-clinical disorder' are used as comparison groups for clinical eating disorder research; normal dieters, symptomatic dieters restrained eaters, high EDI scorers, etc. Hoyt et al. (2003) pointed out that, despite their being calls for more accurate characterisation of these populations, there have as yet been limited attempts to do so. The following sections will discuss these issues in more detail.

8.4.1 Dieting and restraint – the problem of definition

Within the field of attentional bias research, the general conclusion is that non-clinically eating disordered women do not experience the biases inherent in those with AN or BN. However, control groups vary considerably across studies. The most popular categories are 'dieters' and highly restrained eaters. In addition, 'dieters' and those high in restraint are said to lie midway on the continuum of eating behaviour. Many differences are likely to exist between these groups, but more importantly, differences are just as likely to exist *within* the groups. There is no consensual definition of dieting within the field. This was highlighted in Sections 1.3.4 and 1.3.5 where the prevalence rate of dieting was found to differ depending on the phraseology of the question used to ascertain this figure. So, for any one study, the 'dieting' group may be made up of individuals with motives, beliefs and cognitions that differ from one another, and from those of differentially defined groups taking part in other studies. Likewise, section 1.3.5 discussed similar problems with scales used to measure restraint. These problems may go some way in explaining the equivocal results found for these groups within attentional bias research.

Chapter 5 outlined a study where 'dieting' behaviour was broken down into three categories; currently dieting to lose weight, dieting to keep weight where it is right now and *watching* weight in order to avoid putting on weight. Interestingly, only one participant endorsed the second category. In addition, finding weight-loss dieters to take part in the study was difficult, and perhaps surprisingly so given that recruitment was from within a university population. It is possible that there is an unwillingness or feeling of embarrassment connected with dieting, or that there is a degree of confusion associated with its definition. The study in Chapter 5 found only a limited number of

significant differences between the self-report data for WLD, WM and ND. This may explain the lack of a bias between the groups. WLD were more *restrained* than ND, but there was no significant difference in the level of restraint between WM and ND, a result that is in concordance with that found by Wardle et al. (2000). In addition, WLD and WM did not differ in their level of body dissatisfaction. This may further highlight the problems that people have with the definition of dieting. It is quite possible that many of those within the WLD and WM groups actually overlapped in relation to thoughts, emotions and cognitions associated with body image. Moreover, there may have been those in the ND group who were merely on a 'break' from dieting and who actually shared the beliefs of the other two groups. Essentially, the participants may only have differed on their perception of what it means to be on a diet. Interestingly, the number of people stating that they had been on more than one diet during the past year was fairly comparable between the groups, although there was a significant difference between WLD and ND. Future research may wish to study the concept of dieting in further detail. A qualitative analysis asking about people's subjective experiences and feelings of what it means to them to be 'on a diet' would be useful in that it would provide a starting position for a consensual definition of dieting. Even within groups of individuals who admit being on a weight-loss diet there may exist a myriad of reasons for being on that diet. Whereas some diet in order to lose a 'few pounds' for a special occasion, others diet for reasons of health and fitness, and still others diet for reasons relating to body dissatisfaction. Crucially, self or study defined dieters are unlikely to share the same underlying cognitions, feelings and emotions relating to dieting, weight and shape and its importance in their lives, and what it *means* to them to be thin or fat. That is, they are a 'mixed bag'; different groups within a group, some of whom may be at increased risk

of developing an eating disorder and others who are losing weight safely and for appropriate reasons. Talking to the women who participated in the study outlined in Chapter 5, this did appear to be the case. Therefore, it was hardly surprising that no consistent bias was found for this group. In conclusion, researchers need to be very careful when interpreting results if dieting is used as a category for classification.

8.4.2 Dieting, restraint and emotional eating – interchangeable constructs?

The results garnered from the current thesis do not appear to support the claim that dieting and restraint are interchangeable constructs. The results for the high-restrained eaters in the study outlined in Chapter 4 did appear to be similar to those found for eating disordered individuals. However, the dieters in Chapter 5 showed no sign of bias whatsoever, even though the dieters were higher in restraint than non-dieters. Similarly, throughout all of the studies highly restrained eaters reported having been on more diets over the past year than their low-restrained counterparts. So there does appear to be a degree of overlap in their behaviour, but whether or not they are 'cognitively' similar is a contentious issue. Section 1.3.5 discussed the arguments in the field between Polivy (1996), who believes that there is a 'personality trait' of restraint, which is equivalent to dieting, and Lowe et al. (2000), who believe that the two constructs differ both semantically and functionally. Again, the problem is likely one obscured by the constraints of definition, not just of dieting but also of restraint.

The important question relating to the role that dieting plays in the development of clinically diagnosable eating disorders was explored in section 1.3.7. A clear answer to this will likely remain elusive until the field agrees on a definition of dieting. Alternatively, each type of 'dieting' must be looked at as a singular entity rather than being integrated under one umbrella classification.

Emotional eating appears to have received no attention in the field of attentional bias. Similarly, emotional eaters are rarely used as a comparison group in eating disorders research. It does not enter the debate linking restraint and dieting and receives no mention as regards its place on the continuum of eating behaviour. Yet, those who eat in response to their emotions can be described as having aberrant eating patterns. Indeed, emotional eating behaviour is linked to the behaviour demonstrated by those with BN, obesity and binge eating disorders (Lindeman & Stark, 2001; Eldredge & Agras, 1994; Wardle, 1987). Moreover, the high-emotional eaters in the study outlined in Chapter 4 demonstrated biases similar to those with highly restrained eating patterns. This result was interesting principally because high- and low-emotional eaters appeared to differ only in relation to issues of control. Body dissatisfaction and level of restraint did not differ, making it difficult to see what was driving the pattern of bias that is most often associated with concerns about weight and shape. Interestingly, control seemed to play an important role in the differentiation of high- and low-emotional eaters throughout this thesis.

8.4.2.1 The role of control and self-esteem in disordered eating behaviour

Control of food intake has been mentioned as a major feature of AN, particularly in younger sufferers (Fairburn et al., 2003). However, up until recently the matter of life control in general had not been specifically explored in the eating disordered population. Studies using locus of control measures have found equivocal results regarding the role of control in the aetiology of eating disorders. However, Shapiro et al. (1993) believed that the use of this type of measure ignored the multi-dimensional and multifaceted nature of control. Therefore, in the present set of studies a new, and all-encompassing measure was used. Results from the studies outlined in this thesis found that high-

emotional eaters compared to low-emotional eaters demonstrated lower overall control, higher levels of negative control and lower levels of positive control, a pattern similar to that found in those with AN (Surgenor et al., 2003; Shapiro et al., 1993). The high-restrained eaters in the study outlined in Chapter 7 also demonstrated this pattern. That high-emotional and high-restrained eaters showed these patterns is illuminating. It suggests that these aspects are common, to those with weight and shape concerns and to those for whom eating is controlled by emotions. This may indicate that a more comprehensive examination of all aspects of control in clinically eating disordered individuals is warranted. Control may be found to be a key, core factor in the aetiology and maintenance of disordered eating behaviour.

What was not adequately explored in the current work was the issue of mode of control. Participants in the study in Chapter 4 found that the ambiguity of the statements and words used to assess mode of control influenced their ability to respond correctly. Shapiro (1994) believes that respondents should not be assisted with definitions, as using their own interpretation of the word/statement is crucial. However, adhering to this method left many participants unable to respond at all to many statements within this subscale. This was particularly so for non-native English speakers. Future studies may wish to supply participants with common dictionary meanings of the words so that everyone can at least start at a common base. Consensual meanings for each of the statements could be found by gathering definitions from groups of participants similar to those who are likely to take part in the proposed study. Knowing the mode of control used by an individual would be extremely helpful in identifying vulnerable individuals at risk of developing more severe forms of eating disorders, for example those who are using purgative methods as a means of weight control (Surgenor et al., 2003). It would

also allow therapists to help those using maladaptive means of gaining control to switch to more effective methods. The outcome of this would be increased feelings of positive and overall control.

8.4.3 The problematic nature of the continuity debate

As no clinically diagnosed women were used in the current studies, no firm conclusions regarding the continuity debate can be made. However, the results for the high-restrained eaters in Chapter 4 suggest that there may be similarities between this group of restrained eaters and those with clinical eating disorders. Whether or not they are *qualitatively* the same is debatable, and if they are quantitatively the same at what point of the continuum they lie is unclear. The degree of attentional bias for this group was relatively small. Previous studies testing clinically disordered women have used words rather than images, so direct comparisons cannot be made, but bias figures tend to be much higher. Future studies may wish to compare highly restrained and emotional eaters and those with AN, BN and EDNOS within the same study. This would giver a clearer picture of the differences and similarities that exist in implicit cognitions within and between clinical and non-clinical groups.

Sections 1.5.2 and 1.5.3 highlighted the fact that support for either the continuity or discontinuity debate was dependent on the type of measure used. More specifically, when behavioural indicators, such as bingeing and purgative behaviours were used, support was found for the discontinuity perspective. Conversely, psychological measures such as those used in the present work are more likely to support continuity arguments. Pathological or behavioural indicators were not specifically measured in the current series. It would be informative to use such measures in further studies of this type in order to see whether or not these indicators were related to biased processing in non-

clinically disordered groups. The BSQ (Cooper et al., 1987) does contain two questions relating to the frequency of laxative use and emesis as a means of weight control. However, this measure was not used until Chapter 6. Only two women in the studies in Chapters 6 and 7 stated that they used these methods as a means of weight control. It is possible that more women did use these methods, but did not wish to admit to this for the purposes of the study. More importantly, acknowledging to oneself that a behaviour is 'abnormal' or dangerous is a difficult step. Alternatively, it must be recalled that this was a 'normal' population, so it is equally as likely that these behaviours were not used as a means of weight-control.

In conclusion, it is unclear at what point along this continuum, should it exist, that eating behaviour turns from 'normal' to disordered and in turn at what point this changes into behaviour that constitutes a clinical level. Similarities obviously exist, but to consider those with non-clinically diagnosed eating disorders as merely less severe forms of eating disorder may take a conceptual leap. The cognitions of clinically diagnosed individuals are likely to be much more entangled and entrenched and infinitely more complex even in the early stages of the disorder. That non-clinical women are vulnerable is not in doubt, but it is likely that not all individuals within this definition are at risk from going on to develop more severe forms of eating-related problems. Rather than continue to endlessly debate this issue, it may be more useful to treat those with eating-related concerns as a body of people in need of further research and treatment in their own right. Cohen and Petrie (2005) pointed out in section 1.1 that it is likely that clusters of behaviours such as maladaptive eating behaviours, weight and shape concerns and excessive concerns regarding thinness are present in sizeable numbers of young women without clinical disorders. In addition, such thoughts,

behaviours and feelings result in a great deal of pain and anguish for these women who are often overlooked by professionals. A more inclusive approach to treatment may result in more women receiving help at an early stage and may halt the progress into more serious disorder. However, it is equally as important that for the purposes of research these women are not amalgamated into umbrella groups such as 'dieters' because, as well as having similarities, there are aspects of their behaviour and underlying cognitions that are different.

8.5 Images, words, questionnaires and the visual probe – a word about methodology

The utility of using methods borrowed from experimental cognitive psychology was discussed in detail in Chapter 2. Questionnaire measures are subject to intentional and unintentional denials, distortions and misinterpretations. In addition, Williams et al. (1997) wisely made the point that explicit measures are unable to assess aspects of cognition of which the individual is unaware and that these aspects of the individuals psyche maybe be key in understanding their emotional problems.

The Stroop task was for a long time the first choice of researchers wishing to study biases in those with psychopathological disorders. However, there are many problems inherent within this task (see section 2.2.3), most prominently it is dogged with interpretative difficulties. However, whereas the field of anxiety research has moved on apace, the Stroop task remains the chief method of choice for many in the field of eating disorders research. The continuation of its use tells us nothing new as regards the operation of implicit biases in the eating disordered individual. Tasks such as the visual probe task provide us with information about the direction and, importantly, the *degree* of bias. This in turn allows direct comparisons to made both across and

within groups of clinically and non-clinically disordered individuals. In addition, even at the level of the individual, pre- and post-therapy comparisons can be made. Therefore, the use of the visual probe task may provide a more functional tool for those involved in eating disorder related research.

8.5.1 The value of images and the downfall of the 'global measure'

Lee and Shafran (2004) and Faunce (2002) have talked about the problems relating to 'global' measures of eating disorders (section 2.2.3). That is, the mixing of food and body shape words to form one category of 'eating disorder-related words'. As discussed, this makes the discovery of the specific agency of interference, and the distinct concerns of the individual, much more difficult. Even the combination of stimuli within a particular category (e.g. fat and thin related words) is found to be problematic. Vitousek and Orimoto (1993; section 2.2.4) pointed out that a concentration on negative (fat) information would give only a restricted view of body image related processing. Studies by Rieger et al. (1998) and Placanica et al. (2002) attempted to address this problem by separating out fat and thin, and high and low calorie words. Rieger et al. found differential responding towards fat and thin words in those with clinical eating disorders confirming the utility of such a split. The results from the study in Chapter 4 also appeared to lend support to this argument, showing that high-restrained eaters showed a bias towards fat images and a tendency to look away from thin stimuli when each was paired with stimuli of neutral valence. However, Placanica et al. did not find this to be so with high EDI scorers. These authors intimated that this was owing to the nature of the stimuli used, and suggested that perhaps more potent stimuli such as images or photographs would be required to elicit a bias in non-disordered individuals.

The benefit of using images over words was discussed in detail in section 2.2.5. Certainly, the images did appear to elicit an effect in the high-restrained eaters in the study reported in Chapter 4. It was concluded that non-clinically disordered women may require more powerful visual representations in order to draw out evidence of biased processing. However, this does not mean that all previous null results for non-clinically disordered women can suddenly be reversed solely by the use of images. As previously discussed in this chapter, the internal representations relating to weight and shape possessed by clinically eating disordered women are likely to be much more complex, affect laden, controlling and all encompassing than those of non-disordered women. The use of images however, does provide an alternative method that may be more able to detect any underlying problems in vulnerable individuals. What still remains to be assessed is a direct comparison between words and images within the same group of participants, and future work may wish to explore this possibility in more detail. Direct comparisons also need to be made between clinical and non-clinical groups in order to investigate differences and similarities in their responses to image based stimuli.

8.6 Conclusions

This work has incorporated a great many themes and ideas relating to the mechanisms involved in implicit weight and shape related biases in non-clinically eating disordered women. The aims outlined in section 2.3 have been addressed in detail in the preceding discussion and throughout the thesis. The following section seeks only to outline the main features of what has gone before.

- Up until now, women with aberrant eating behaviours of a non-clinical nature have been overlooked as individuals in their own right. They are often

overlooked by professionals and left out of treatment programmes and research. Speaking to the women who participated in the current research, it is obvious that many do not recognise that their eating behaviour may be problematic, after all severe restraint, dieting, and skipping meals are often considered the norm, particularly among the student population. This is a dangerous situation that is ripe for the development of clinical eating disorders. In addition, when they do recognise that all may not be well, they are confused as to whom to ask for help. Some even find the usual channels of help ineffective, too busy or simply without the key skills or interest necessary to help what is, a distinctive group of women. A major, if up until now largely unspoken, aim of this research was that this group of women (and men) would receive more attention from those in a position to help.

- The possibility that slowed disengagement from, rather than an increased vigilance towards schema-congruent information, is the cause of biased attention was a major finding of this thesis. That this has not previously been explored by those in the field of eating disorders, despite the work already done by anxiety researchers, is perturbing, particularly as this may impact on treatments and the theories on which they are based. Further work in this area is urgently required

- There are calls for more sophisticated theories that may feed into new improved methods of treatment, yet new research still emerges that continues to use the Stroop task. It is obvious from the results obtained in the present set of studies that the mechanisms of attentional bias in weight and shape concerned women are much more complex than first thought. In addition, the current work

illustrates that much can be learnt about the cognitions of weight and shape concerned women through taking a more sophisticated, multifaceted, and forward-looking approach. Researchers in this field especially need to think more about the timecourse of attention and issues relating to competition.

- More thought needs to be put into the type of non-clinically disordered control groups used in this type of research. In addition, there is a need to work towards a clearer set of definitions of these groups. Distinctions should be made between the groups for the purposes of research in order that accurate cross-study comparisons can be made. However, treatment and research opportunities should be made available to all those for whom weight, shape and eating constitute a major threat to quality of life, not only for those who fit neatly into specific classifications. Those who are currently left out of research may be key in the understanding of the aetiology of eating disorders.

- The current research has found that the use of visual representations of fat and thin information are useful in uncovering biases in non-disordered populations. The development of a standardised set of such stimuli for use in this type of research is deemed valuable objective for the future. Accurate biometric data relating to these images should be an integral part of the information made available to researchers wishing to use these stimuli.

The mechanisms of attentional bias are much more complex than is acknowledged by many in the field of eating disorders research. Those in the field of anxiety research have extensively explored the complexity of such mechanisms, and from them we should take a lead. This will help advance theoretical knowledge and will serve to enhance existing

treatment methods. This knowledge will be key in the development of more effective preventative measures that can be used not only for children but for all women who may be entering a particularly difficult time in their life, such as leaving home, going to university, facing a marriage break-up or starting a new job.

Finally, it is hoped that the current research and its findings will provide an impetus for others. Importantly, it should not constitute an end, but the beginning of a fruitful line of research in this field.

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APPENDICES

Appendices:- **Appendix 1**

DIETING & REACTION TIME STUDY (1a & 1b) CONSENT FORM

9th April 2003

Participant Consent Form (version 1.1)

DIETERS, DO YOU CONFIRM THAT YOU:

- **HAVE** been making an attempt to lose weight for at least 4 weeks (i.e. following a standard reducing diet and/or setting definite dietary rules concerning a calorie limit, when to eat or what foods should be eaten) **Yes No**

NON-DIETERS, DO YOU CONFIRM THAT YOU:

- Have **NOT** been making an attempt to lose weight for at least 4 weeks (i.e. HAVE NOT been following a standard reducing diet and/or setting definite dietary rules concerning a calorie limit, when to eat or what foods should be eaten) **Yes No**

It is understood that filling in the questionnaires in this study may raise issues or concerns relating to the areas of food, eating and body weight/shape or your feelings in general. Therefore, at the end of the study there will be an opportunity for discussion and in addition an information sheet detailing useful contacts and information relating to these issues will be given.

HAVE YOU:

1. read the information sheet explaining the study? **Yes No**
2. had the opportunity to ask questions and discuss the study? **Yes No**
3. received satisfactory answers to all your questions concerning the study? **Yes No**
4. received enough information about the study? **Yes No**

To whom have you spoken? ----------

DO YOU UNDERSTAND:

that you are free to withdraw from the study and are free to withdraw your data from any future analysis and/or publication;

1. at any time? **Yes No**
2. without having to give a reason for withdrawing? **Yes No**

Appendices:-

Appendix 1

I hereby fully & freely consent to participate in the study entitled:

The Dieting & Reaction-Time Study (1a)

- I understand the nature and purpose of the procedures involved communicated to me on a separate information sheet.

- I understand and acknowledge that the investigation is designed to promote scientific knowledge and the university will use my data for no purpose other than research.

- I understand that the data collected during the course of this study will not be used in a clinical way and will not be disclosed to my GP.

- I understand that a numerical code will replace my name so that my data can remain confidential and that I will not be identified in any way when the research is published.

- I understand that the University of Bristol may use the data collected for this study in a future research project but that the conditions on this form under which I have provided the data, will still apply.

- I understand that I will be given the opportunity to discuss matters arising from the study, and that information relating to these matters will be made available to me

- I agree to the University of Bristol recording and processing the data I provide during the course of this study unless I state otherwise. I understand that this information will be used only for the purpose/s set out in the information sheet, and my consent is conditional upon the University complying with its duties and obligations under the data protection act.

Participant's signature ---------- Date----------

Name in BLOCK capitals----------

Appendix 2

Sources of Internet Images

Body Images

www.alwaysforme.com:	Plus size swimwear catalogue for women
www.bigonbatik.com:	Plus size clothing catalogue for women
www.figleaves.co.uk:	Lingerie and swimwear for women
www.littlewomen.co.uk:	Lingerie and swimwear for smaller women
www.juonia.com:	Activewear for plus size women
www.loveyourpeaches.com:	Clothing catalogue for plus size women
www.next.co.uk:	Clothing catalogue for women and men
www.swimsuitsjustforus.com:	Plus size swimwear for women
www.uniquelyme.com:	Plus size clothing and community for women
www.zaftique.com:	Clothing for plus size women

Neutral Images

www.argos.co.uk:	Online general merchandise catalogue
www.lxdirect.co.uk:	Online general merchandise catalogue

DIETING & REACTION TIME STUDY (1a) INFORMATION SHEET

7th May 2003

Participant information sheet (version 1.1a)

The Task

This study aims to gather the opinions of a group of female dieters and non-dieters on the subject of body shape and food classification.

The task will involve:
(a) rating the shape of pictures of women (i.e. are they very fat or very thin) and,
(b) the calorific value of pictures of different foods (i.e. is it high or low calorie),

Each picture will be presented on a computer screen for 500 milliseconds (1/2 a second)

On completion of these tasks you will be asked to fill in a questionnaire, asking about your attitudes, feelings and behaviours surrounding the areas of dieting and your body in general. It is expected that the tasks will take up to, but no longer than one hour to complete.
There will be opportunity to discuss the study and any issues raised by the study on completion of the tasks. All information gathered is confidential, you will be known only by a study number, only the experimenter has access to these numbers.

Am I suitable for the study?

You are suitable if you are:

- Female
- Aged 18-45 years old

and

have either:

i. been making an attempt to lose weight for at least 4 weeks (i.e. following a standard reducing diet and/or setting definite dietary rules concerning a calorie limit, when to eat, or what foods should be eaten).

Or

ii. have **NOT** been making an attempt to lose weight for at least 4 weeks (i.e. have not been following a standard reducing diet and/or setting definite

Appendix 3

dietary rules concerning a calorie limit, when to eat, or what foods should be eaten).

You are not suitable if;

- ❖ You have at present, or have in the past had a clinically diagnosed eating disorder.

Note that you are free to withdraw from the study at any time without having to give a reason for doing so.

You will be paid £5.00 on completion of the tasks.

The study will take place at 5 Priory Road.

If you wish to take part in the study, please e-mail me to arrange a date for participation.
If you require further information regarding the study you can contact me again via e-mail.

Thank You
Sara Nelson
Sara.nelson@bristol.ac.uk

DIET & REACTION TIME STUDY (1a & 1b) DEBRIEFING INFORMATION SHEET

7th May 2003

Debriefing Information Sheet (version 1.1)

Thank you, for taking part in the diet and reaction time study (1a). This information sheet aims to give you a further explanation of the study, including aims and objectives.

Aims of The Diet and Reaction Time Study

The purpose of the present study was to develop a 'gold standard' set of body shape and food stimuli. The ratings that you gave will allow the division of the pictures into separate body shape and food categories. These pictures may then be used in studies concerned with dieting and body shape concerns.

The inclusion of the Eating Disorders Inventory (EDI) in the study will allow an evaluation to be made of any differences that may exist in the ratings of body shape and food categories, between women with varying levels of concern surrounding the issues of body weight and shape. Similarly, personal weight and height information will be used to calculate your body mass index* (BMI) in order to assess any differences in ratings that may be present between those of differing BMIs.

If you require any further information relating to this study, please do not hesitate to e-mail me at:

sara.nelson@bristol.ac.uk

Thank You

* Measure of the relationship between a person's height and weight.

Appendix 5

INFORMATION FOR CONCERNED PARTICIPANTS (version 1.1)

It is understood that filling in the questionnaires in this study may have raised issues or concerns relating to the areas of food, eating and body weight/shape or your feelings in general. If this is the case, or if on reflection you feel that you would like to speak to someone or need any further information on any of the issues raised, the following information sheet lists some of the bodies that are available to help.

The researcher is not qualified to give out advice regarding eating disorders or any other mental health problem, however, if you wish to discuss the study or any of the issues raised by the study do not hesitate to contact me at sara.nelson@bristol.ac.uk

- **Your GP**
  If you are concerned in any way about your eating habits or feelings and emotions in general, your first point of contact should always be your GP.

- **The Eating Disorders Association**
  This is a charity organisation that provides information, support and help for those affected by an eating disorder, and their friends and family. They will be able to provide you with contacts in you local area.
  They run a helpline from 9am-6.30pm, Monday to Friday, the number is:
  0160306210414 (calls charged at national rate). Or you can visit the Web site:
  http://www.edauk.com
  Alternatively, you may e-mail them. A confidential e-mail form is available on the site: Main menu: click 'getting help' – then click 'alternative ways to contact EDA'.

- **The Somerset Eating Disorders Association**
  This organisation is based in Street in Somerset and runs a variety of support services for those with an eating problem. For further information, visit the website:
  http://www.web.ukonline.co.uk/seda/

- **Student Counselling Service**

The University has a professional counselling service for all full time students. Many of our decisions are made and problems clarified or resolved by talking them over with someone - friends, family, and tutors. However, there are times when it seems right to seek help elsewhere - the Student Counselling Service exists to meet this need, offering confidential support to students with problems of many kinds.
The Service is open from 9.30 am to 5.00 pm Monday to Friday. To make an appointment ring or call in between 10.00 am and 2.00 pm when reception is open. Appointments are for 50 minutes and may be fitted into any gaps in your academic timetable or in your lunch hour. Appointments may continue on a weekly basis for two or more weeks. Because developing a shared

understanding is crucial, all your appointments will be with the same counsellor, unless you ask to change. Contact the at: 1a Priory Road (up the outside staircase) or Tel/Minicom: (0117) 954 6655 Internal: 46655 or visit the website at;
www.bris.ac.uk/Depts/StudentCounselling

Nightline

Nightline is run and staffed by students for students. It operates during term time only and is staffed by trained volunteers. It has two main roles, an information service and a confidential listening service. The service is available from 8.00 am to 8.00 pm (term time). **Tel: (0117) 926 6266.**

MIND – the mental health charity

Mindinfoline

Offers thousands of callers every year, vital, confidential help on a range of mental health problems and their consequences.

You can ring **0845 7660 163** from anywhere in the UK for the price of a local call. Mind*info*Line is open Monday to Friday 9.15am-5.15pm.

For deaf or speech impaired enquirers the Mind*info*Line's **textphone** number is **0845 330 1585** (If you are using BT Textdirect add the prefix 18001).

Language Line is a telephone translation and interpreting service with access to more than 100 languages. The 3-way conferencing facility enables information staff to communicate effectively through a trained interpreter in minutes, making Mind*info*line accessible to many people whose first language is not English

Email the Information Unit at info@mind.org.uk

Bristol Mind – **contact for information on local services**

Telephone: 0117 914 1234
Fax: 0117 914 1235
Email address: coordinator.bristolmind@virgin.net

Visit the MIND website at; http://www.mind.org.uk**Remember,**

DO NOT worry alone, talk to someone!

Appendices:-

Appendix 6 – Thin and Fat Images

Thin Images

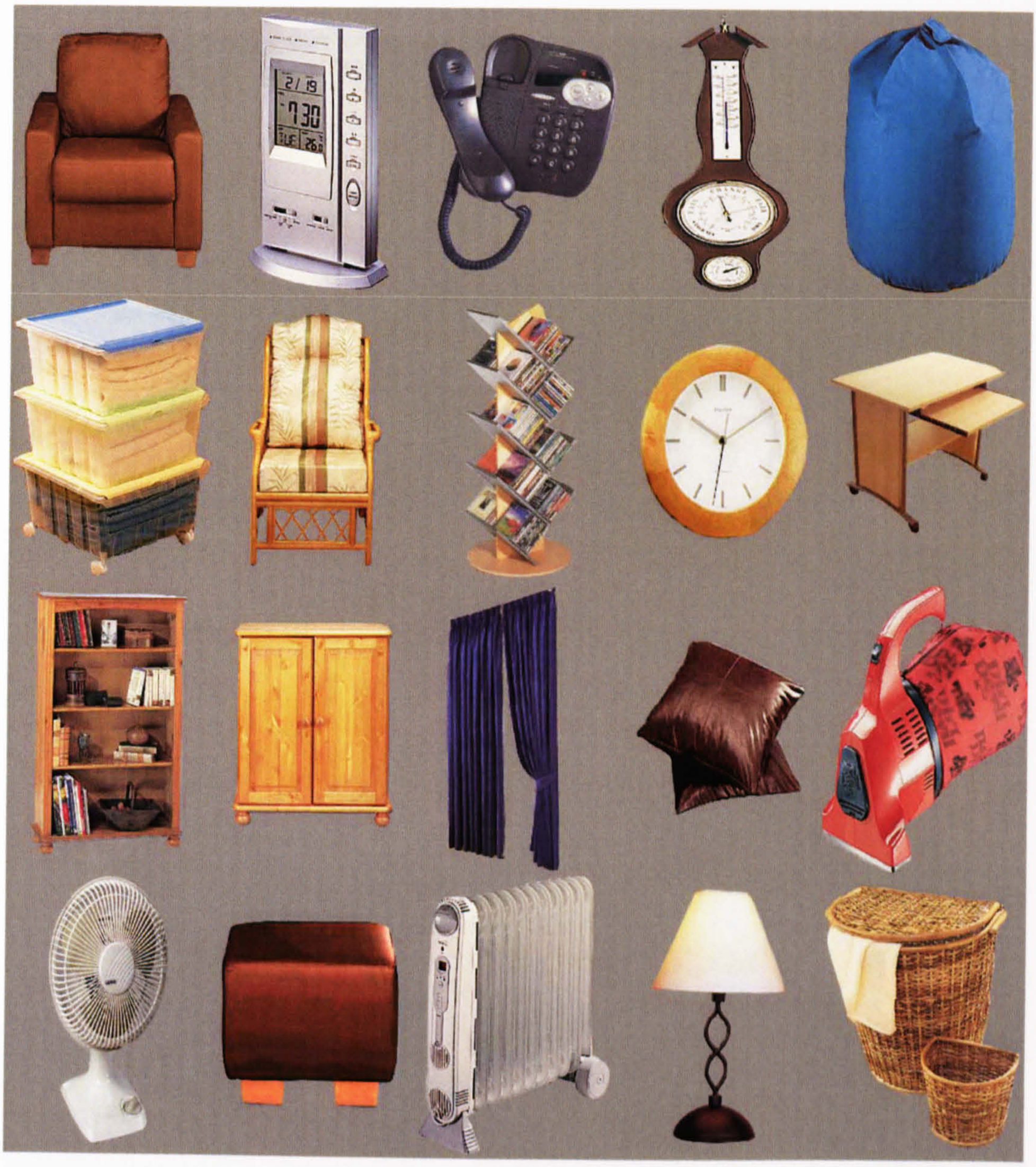
Appendices:-

Appendix 6 – Thin and Fat Images

Fat Images

Appendix 7 – Neutral Images

Neutral Images



Appendices:-

Appendix 7 – Neutral Images

Neutral Images

Appendix 8

DIETING & REACTION TIME STUDY 2 INFORMATION SHEET

August 12, 2003

Participant information sheet (version 2.0)

The Tasks

This study aims to measure the response times of groups of dieters and non-dieters when presented with a series of pictures of women of differing body shapes.

The tasks will involve pressing a button in response to an arrow that follows pairs of pictures presented on a computer screen.

On completion of these tasks you will be asked to fill in a series of questionnaires, asking about your attitudes, feelings and behaviours surrounding the areas of dieting, your body and your emotions in general. Your weight and height will be recorded (with your permission).

It is expected that the tasks will take up to, but no longer than one hour to complete. There will be an opportunity to discuss the study and any issues raised by the study on completion of the tasks. All of the information gathered is confidential. You will be known only by a study number; only the experimenter has access to these numbers.

Am I suitable for the study?

You are suitable if you are:

- Female
- Aged 18-45 years old

I require both dieters and non-dieters

For the purpose of the present study, a dieter is defined as:

Someone who has been making an attempt to lose weight or maintain their weight at its present level for at least 4 weeks (i.e. following a standard reducing diet and/or setting definite dietary rules concerning a calorie limit, when to eat, or what foods should be eaten).

If you have previously participated in diet and reaction time study 1a and 1b (rating pictures of bodies and food) you are **NOT** eligible for participation in this study.

Note that you are free to withdraw from the study at *any* time without having to give a reason for doing so.

Appendix 8

You will be credited with 1-hour experimental hours on completion of the tasks.

If you have any further questions do not hesitate to contact me by e-mail or alternatively, there will be an opportunity to speak to me alone during the consent procedure.

Thank you,

Sara Nelson

sara.nelson@bristol.ac.uk

Appendix 9

DIETING & REACTION TIME STUDY 2
CONSENT FORM

12th August 2003

Participant consent form (version 2.0)

DIETERS ONLY, please answer the following question:
Do you confirm that you:

- **HAVE** been making an attempt to lose weight or maintain weight at its present level for at least 4 weeks (i.e. following a standard reducing diet and/or setting definite dietary rules concerning a calorie limit, when to eat or what foods should be eaten) **Yes No**

NON-DIETERS ONLY, please answer the following question:
Do you confirm that you:

- Have **NOT** been making an attempt to lose weight or maintain weight at its present level for at least 4 weeks (i.e. HAVE NOT been following a standard reducing diet and/or setting definite dietary rules concerning a calorie limit, when to eat or what foods should be eaten)

Yes No

It is understood that filling in some of the questionnaires in this study may raise issues or concerns relating to the areas of food, eating and body weight/shape or your feelings in general. Therefore, at the end of the study there will be an opportunity for private discussion and in addition an information sheet detailing useful contacts and information relating to these issues will be supplied to you.

HAVE YOU:

1. read the information sheet explaining the study? **Yes No**
2. had the opportunity to ask questions and discuss the study? **Yes No**
3. received satisfactory answers to all your questions concerning the study? **Yes No**
4. received enough information about the study? **Yes No**

To whom have you spoken? ——————————————————————

Appendix 9

DO YOU UNDERSTAND:

that you are free to withdraw from the study and are free to withdraw your data from any future analysis and/or publication;

1. at any time? **Yes**
   No
2. without having to give a reason for withdrawing? **Yes**
   No

I hereby fully & freely consent to participate in the study entitled:

Dieting & Reaction-Time Study 2

- I understand the nature and purpose of the procedures involved communicated to me on a separate information sheet.
- I understand and acknowledge that the investigation is designed to promote scientific knowledge and the university will use my data for no purpose other than research.
- I understand that the data collected during the course of this study will not be used in a clinical way and will not be disclosed to my GP.
- I understand that a numerical code will replace my name so that my data can remain confidential and that I will not be identified in any way when the research is published.
- I understand that the University of Bristol may use the data collected for this study in a future research project but that the conditions on this form under which I have provided the data, will still apply.
- I understand that I will be given the opportunity to discuss matters arising from the study, and that information relating to these matters will be made available to me
- I agree to the University of Bristol recording and processing the data I provide during the course of this study unless I state otherwise. I understand that this information will be used only for the purpose/s set out in the information sheet, and my consent is conditional upon the University complying with its duties and obligations under the data protection act.

Participant's signature ---------- Date----------

Name in BLOCK capitals----------

Appendix 10

DIET & REACTION TIME STUDY 2
DEBRIEFING INFORMATION SHEET

Thank you, for taking part in the diet and reaction time study. This information sheet aims to give you a further explanation of the study, including aims and objectives.

Background

It is recognised that many things, in combination are likely to contribute to the development of eating related problems; for example, dieting and excessive concerns about your weight and/or shape. Whilst the majority of dieters do not develop problems, for a few, it may lead to a degree of disordered eating or excessive concerns about how they look. It is therefore important to find out what it is that distinguishes those dieters who do develop problems from those who do not.

Aims of The Diet and Reaction Time Study

Many studies have found that those with a clinical eating disorder show attentional biases towards information relating to eating, weight and shape and this has been blamed for the maintenance of the disorder. It may be that if such biases are found to exist in certain types of dieters or those who are excessively concerned about their weight and/or shape, this may give an indication of those who are more likely to go on to develop some degree of problem surrounding the issues of food, eating, weight and shape and for whom some form of help e.g. counselling may be beneficial. Results from studies already carried out in this area show mixed results.

Such studies tend to use a dot probe detection task similar to the one you have just carried out today. However, up until now these studies have used body shape words like thin, plump etc, rather than pictures of bodies. Many researchers believe that words may not be strong enough stimuli to show any biases in those who do not have a clinically diagnosed eating disorder. The present study therefore aimed to use body pictures instead of words to look for these biases in dieters and those with concerns about their weight and shape.

The inclusion of the Eating Disorders Inventory (EDI) in the study will allow us to see if there are any differences in responses on the dot probe task between women with varying levels of concern surrounding the issues of body weight and shape. Similarly, personal weight and height information will be used to calculate your body mass index* (BMI) in order to assess any differences in responses that may be present between those of differing BMIs.

* Measure of body 'size' adjusted for height

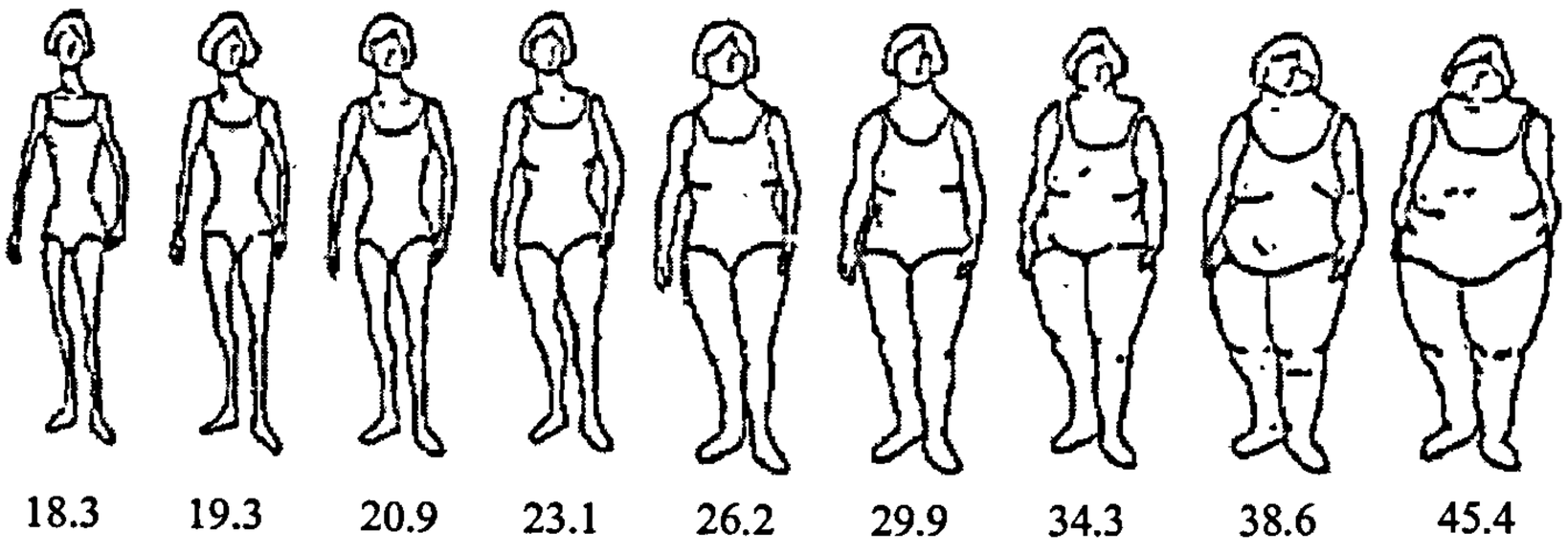
If you require any further information relating to this study, please do not hesitate to e-mail me at:

sara.nelson@bristol.ac.uk

Thank You

Appendix 11

Stunkard et al. (1983) Female Figural Stimuli for the Measurement of Body Dissatisfaction

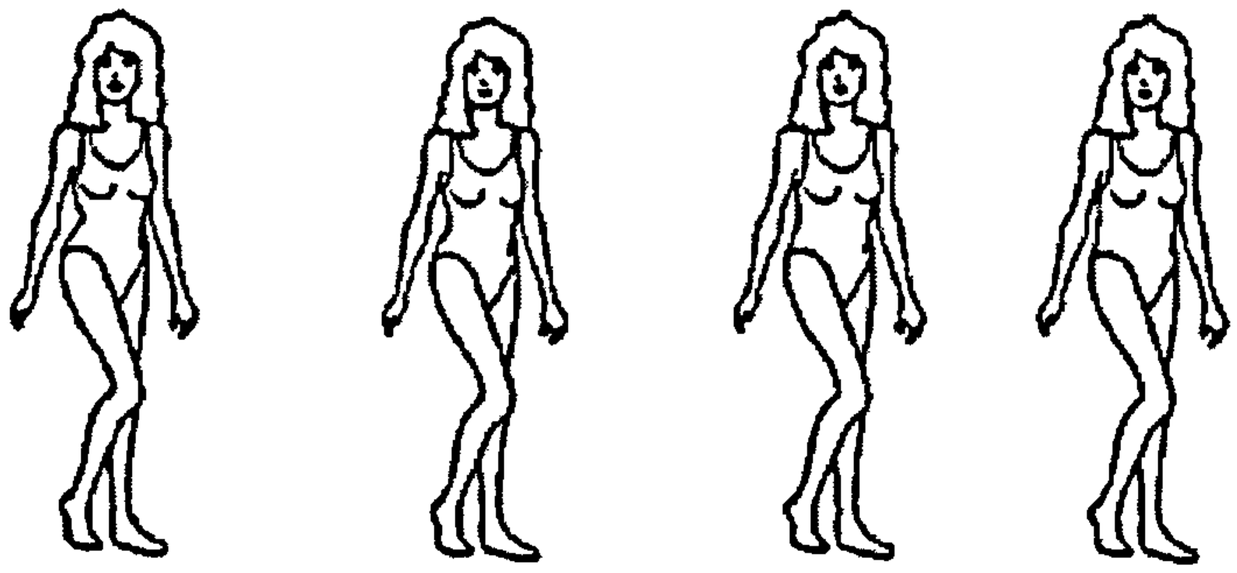


Figures correspond to Bulik et al. (2001) BMI norms for all ages (18-100 years)

Appendix 12

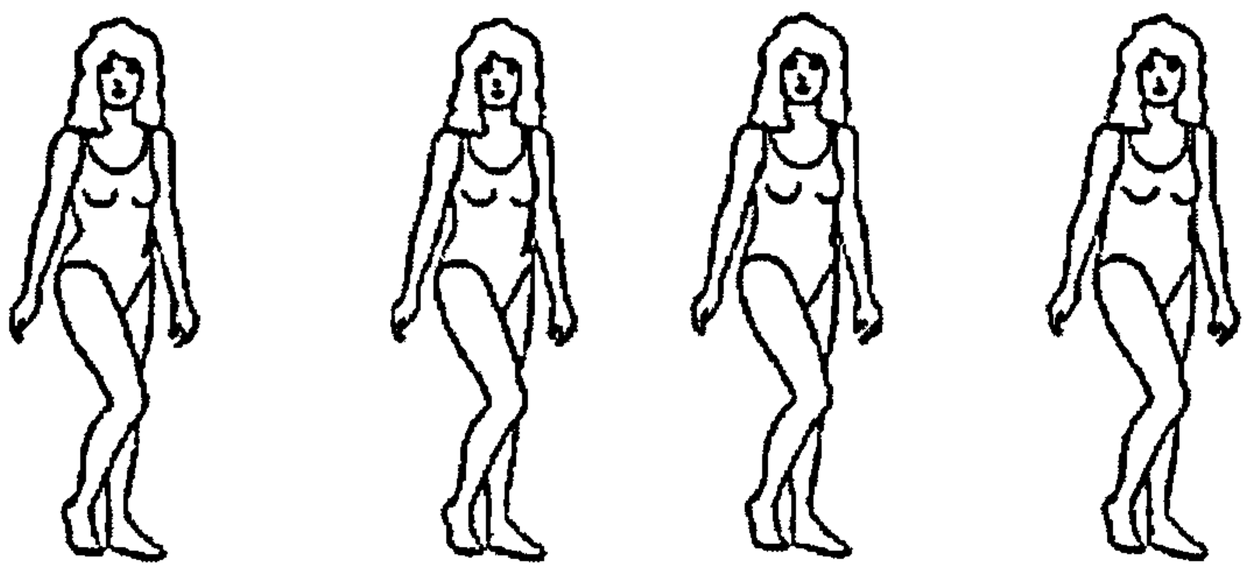
Singh Figural Stimuli (from Singh, 1994)

I



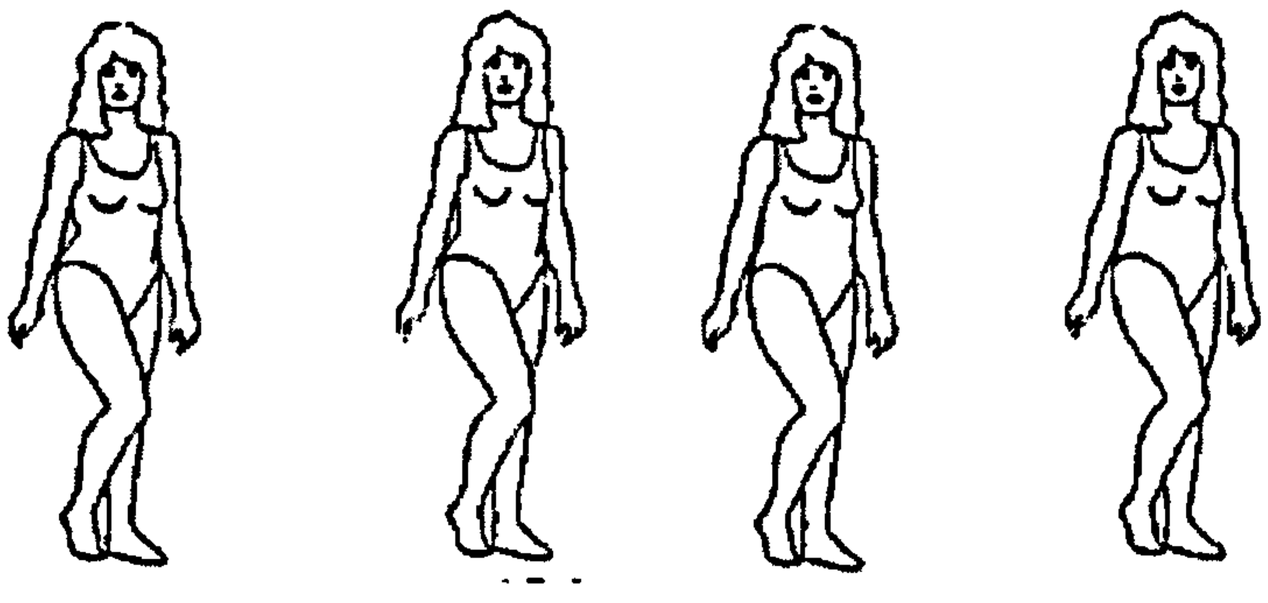
WHR 0.7 0.8 0.9 1.0

II



WHR 0.7 0.8 0.9 1.0

III



WHR 0.7 0.8 0.9 1.0

I Underweight

II Normal weight

III Overweight

DIETING & REACTION TIME STUDY 3
INFORMATION SHEET

28th January 2004

Participant Information Sheet (version 3.0)

The Tasks

This study aims to measure the response times and opinions of groups of dieters and non-dieters when presented with a series of pictures of women. The tasks will involve:

(a) pressing a button in response to an arrow that follows pairs of pictures presented on a computer screen.
(b) Rating the size, pleasantness and age of pictures of different women.

On completion of these tasks you will be asked to fill in a series of questionnaires, asking about your attitudes, feelings and behaviours surrounding the areas of dieting, your body and your emotions in general. With your permission, your weight and height will be recorded. Only the principle investigator will be present in the room when this is carried out.
It is expected that the tasks will take up to, but no longer than 1 1/2 hours to complete. There will be an opportunity to discuss the study and any issues raised by the study on completion of the tasks. All of the information gathered is confidential. You will be assigned a study number to maintain your anonymity.

Am I suitable for the study?

You are suitable if you are:

- Female
- Aged 18-45 years old

I require both dieters and non-dieters

If you have previously participated in diet and reaction time study 1a and 1b (rating pictures of bodies and food) and study 2 you are **NOT** eligible for participation in this study.

Note that you are free to withdraw from the study at *any* time without having to give a reason for doing so.

You will be credited with 1.5 experimental hours credit on completion of the tasks.

If you have any further questions do not hesitate to contact me by e-mail or alternatively, there will be an opportunity to speak to me alone during the consent procedure.

Thank you,

Sara Nelson sara.nelson@bristol.ac.uk

Appendix 14

Diet & Reaction Time Study 3
CONSENT FORM

Please answer the following questions to the best of your knowledge

It is understood that filling in some of the questionnaires in this study may raise issues or concerns relating to the areas of food, eating and body weight/shape or your feelings in general. Therefore, at the end of the study there will be an opportunity for private discussion and in addition an information sheet detailing useful contacts and information relating to these issues will be supplied to you.

HAVE YOU:	YES	NO
(i) read the information e-mail sent to you explaining about the study?	❑	❑
(ii) had an opportunity to ask questions and discuss this study?	❑	❑
(iii) received satisfactory answers to all your questions?	❑	❑
(iv) received enough information about the study?	❑	❑

To whom have you spoken?

DO YOU UNDERSTAND:

that you are free to withdraw from the study and free to withdraw your data from any future analysis and/or publication

• at any time	❑	❑
• without having to give a reason for withdrawing	❑	❑

I hereby fully and freely consent to participate in a study entitled:

Dieting & Reaction-Time Study 3

- I understand the nature and purpose of the procedures involved communicated to me on a separate information sheet (sent out in either paper or electronic form) entitled Diet and reaction time study 3 information sheet.

- I understand and acknowledge that the investigation is designed to promote scientific knowledge and that the University will use my data for no purpose other than research.

- I understand that a numerical code will replace my name so that my data can remain confidential and that I will not be identified in any way when the research is published.

- I understand that the University of Bristol may use the data collected for this project in a future research project but that the conditions on this form under which I have provided the data will still apply.

Appendix 14

- I agree to the University of Bristol recording and processing the data I provide during the course of this study unless I state otherwise. I understand that this information will be used only for the purpose(s) set out in the information sheet, and my consent is condition upon the University complying with its duties and obligations under the Data Protection Act.

- I understand that I will be given the opportunity to discuss matters arising from the study, and that information relating to these matters will be made available to me.

- I understand that the data collected during the course of this study will not be used in a clinical or diagnostic way and will not be disclosed to anyone outside the research group, nor my General Practitioner (doctor) without my explicit consent.

Signature Participant: _____ Date: _____

(Name in BLOCK Letters): _____

USEFUL CONTACTS (version 3.0)

It is understood that filling in the questionnaires in this study may have raised issues or concerns relating to the areas of food, eating and body weight/shape or your feelings in general. If this is the case, or if on reflection you feel that you would like to speak to someone or need any further information on any of the issues raised, the following information sheet lists some of the bodies that are available to help.

The researcher is not qualified to give out advice regarding eating disorders or any other mental health problem, however, if you wish to discuss the study or any of the issues raised by the study do not hesitate to contact me at sara.nelson@bristol.ac.uk

- **Your GP**
  If you are concerned in any way about your eating habits or feelings and emotions in general, your first point of contact should always be your GP. You could also talk to the practice nurse/health visitor.

- **The Eating Disorders Association**
  This is a charity organisation that provides information, support and help for those affected by an eating disorder, and their friends and family. They will be able to provide you with contacts in you local area.
  They run a helpline from 9am-6.30pm, Monday to Friday, the number is:

  Adult helpline (over 18 years old)**:0845 634 1414** (8.30am – 8.30pm Mon-Fri)
  Youthline (up to an including 18 years old): **0845 634 7650** (4pm-6.30pm Mon-Fri). Or visit the website:
  http://www.edauk.org

  Alternatively, you may e-mail them. A confidential e-mail form is available on the site: Main menu: click 'getting help' – then click 'alternative ways to contact EDA'.

- **The Somerset & Wessex Eating Disorders Association**
  This organisation is based in Street in Somerset and runs a variety of support services for those with an eating problem in Somerset and the surrounding counties. For further information, visit this very informative website:
  http://www.swedauk.org

- **Student Counselling Service**

  The University has a professional counselling service for all full time students. It offers confidential support to students with problems of many kinds.

The Service is open from 9.30 am to 5.00 pm Monday to Friday (closed August). To make an appointment ring or call in between 10.00 am and 2.00 pm when reception is open. Appointments are for 50 minutes and may be fitted into any gaps in your

academic timetable or in your lunch hour.Go to: 1a Priory Road (up the outside staircase) or Tel/Minicom: (0117) 954 6655 Internal: 46655 or visit the website at; www.bris.ac.uk/Depts/StudentCounselling

Nightline

Nightline is run and staffed by students for students. It operates during term time only and is staffed by trained volunteers. It has two main roles, an information service and a confidential listening service. The service is available from 8.00pm to 8.00 am (term time). **Tel: (0117) 926 6266.**

MIND – the mental health charity

Mindinfoline

Offers thousands of callers every year, vital, confidential help on a range of mental health problems and their consequences.

You can ring **0845 7660 163** from anywhere in the UK for the price of a local call. Mind*info*Line is open Monday to Friday 9.15am-5.15pm.

For deaf or speech impaired enquirers the Mind*info*Line's **textphone** number is **0845 330 1585** (If you are using BT Textdirect add the prefix 18001).

Language Line is a telephone translation and interpreting service with access to more than 100 languages. The 3-way conferencing facility enables information staff to communicate effectively through a trained interpreter in minutes, making Mind*info*line accessible to many people whose first language is not English

Email the Information Unit at info@mind.org.uk

Bristol Mind – **contact for information on local services: 0117 914 1234.**

e-mail: coordinator.bristolmind@virgin.net

Visit the MIND website at; http://www.mind.org.uk

Student Health Service

The student health service also has an excellent web site with info and downloadable leaflets on many health related problems. There is also a very useful and comprehensive links page that connects you to other health related sites, groups and societies for every imaginable worry or concern you may have. Visit:

http://bristol.ac.uk/studenthealthservice/links

Remember, DO NOT worry alone, talk to someone!

Female Attractiveness & Visual Attention
INFORMATION SHEET

17th May 2004

Participant Information Sheet (version 1.0)

The Tasks

This study aims to measure the reactions and opinions of groups of women when presented with a series of pictures of other women taken from internet swimwear catalogues. The tasks will involve:

(a) Responding as quickly as possible to images that appear on a computer screen
(b) Rating the size, and attractiveness of pictures of different women.

On completion of these tasks you will be asked to fill in a series of questionnaires, asking about your attitudes, feelings and behaviours surrounding the areas of eating, your body and your emotions in general. With your permission, your weight and height will be recorded. Only the principal investigator will be present in the room when this is carried out.
It is expected that the tasks may take up to, but no longer than 1 1/2 hours to complete (usually 1 hour). There will be an opportunity to discuss the study and any issues raised by the study on completion of the tasks. All of the information gathered is confidential. You will be assigned a study number to maintain your anonymity.

Am I suitable for the study?

You are suitable if you are:

- Female
- Aged 18-45 years old

Note that you are free to withdraw from the study at *any* time without having to give a reason for doing so.

You will be paid £5 on completion of the tasks

If you have any further questions do not hesitate to ask.

Thank you,

Sara Nelson
Sara.nelson@bristol.ac.uk

Appendix 17

Female Attractiveness & Visual Attention
DEBRIEFING INFORMATION SHEET

Thank you, for taking part in the Female attractiveness and visual attention study. This information sheet aims to give you a further explanation of the study, including aims and objectives.

Background

It is recognised that many things, in combination are likely to contribute to the development and maintenance of eating related problems; for example, dieting and excessive concerns about your weight and/or shape. Whilst the majority of dieters and restrained eaters do not develop problems, for a few, it may lead to a degree of disordered eating or excessive concerns about how they look. It is therefore important to find out what it is that distinguishes those who do develop problems from those who do not.

Aims of The Female Attractiveness and Visual Attention Study

Many studies have found that those with a clinical eating disorder are more likely to look *towards* or preferentially seek out information relating to eating, weight and shape (i.e. show a selective attention bias). More specifically, those with eating disorders appear to show a bias towards 'fat'- related words (e.g. fat, plump, large) in preference to 'thin'-related words (e.g. thin, skinny, small). Similar results have been found when testing restrained and emotional eaters and those with body image related problems.

Recently, however some researchers have suggested that the results of such tasks could equally be indicative of a difficulty to *disengage* from this type of information. Continual focus on body image related information might lead to the maintenance of excessive body-image concerns or eating related problems in certain vulnerable individuals. Differentiating disengagement problems from selective attention biases is important, as it may change the focus of treatments such as cognitive behavioural therapy. As yet, no studies that specifically look at disengagement issues have been carried out on those with weight and shape concerns or restrictive and emotional eating patterns. This study aims to look at this group of women and to measure the extent of any problems with disengagement they may have when looking at other women of varying sizes.

The computer task that you initially carried out is called an *overlap* task, and is designed to measure how long it takes you to disengage from the different types of images. In line with current cognitive behavioural theories of eating disorders, it is predicted that those with excessive concerns about their weight and shape may take longer to disengage from 'fat' related images compared to 'thin' or neutral type images.

The inclusion of eating behaviour and body image questionnaires in the study, will allow us to see if there are any differences in responses on the task between women with varying levels of concern surrounding the issues of body weight, shape and eating. Similarly, personal weight and height information and waist and hip measurements will be used to calculate your body mass index* (BMI) and waist-hip ratio** (WHR) in order to assess any differences in responses that may be present between those of differing BMI and WHR.

* Measure of body 'size' adjusted for height

** Measure of body 'shape' from 'hourglass' (curvaceous) to straight up and down (uncurvy).

If you require any further information relating to this study, please do not hesitate to e-mail me at:

sara.nelson@bristol.ac.uk

Useful References

All of these references can be found either via electronic journals or in the arts and social sciences library. Should you have any difficulty finding any of these references please do not hesitate to contact me.

Appendix 17

General Eating Disorder Review

Fairburn, C.G. and Harrison, P.J. (2003). Eating disorders. *The Lancet*, **361** (Feb.), 404-416.

Cognitive Behavioural Theories of Eating Disorders

Vitousek, K.B., and Orimoto, L. (1993). Cognitive-behavioural models of anorexia nervosa, bulimia nervosa, and obesity. In K.S. Dobson and P.C. Kendall (Eds.), *Psychopathology and Cognition,* pp. 191 – 242. San Diego: Academic Press. (RC454.4psy – Arts library)

Attentional Biases and Disengagement

Faunce, G.J. (2002). Eating Disorders and Attentional Bias: A Review. *Eating Disorders*, **10**, 125 – 139.

Koster, E.H.W., Crombez, G., Verschuere, B., and De Houwer, J. (in press). Selective attention to threat in the dot probe paradigm: Differentiating vigilance and difficulty to disengage. *Behaviour Research and Therapy.*

Placanica, J.L., Faunce, G.J., and Soames Job, R.F. (2002). The effect of fasting on attentional biases for food and body shape/weight words in high and low eating disorder inventory scorers. *International Journal of Eating Disorders,* **32**, 79 – 90 .

Rieger, E., Schotte, D.E., Touyz, S.W., Beumont, P.J.V., Griffiths, R., and Russell, J. (1998). Attentional biases in eating disorders: A visual probe detection procedure. *International Journal of Eating Disorders,* **23**, 199 – 205.

Thank You